

**STUDIES IN THE DERMAPTERA AND ORTHOPTERA OF THE COASTAL PLAIN  
AND PIEDMONT REGION OF THE SOUTHEASTERN UNITED STATES.**

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In the summers of 1911 and 1913, the present authors made extensive collections of, and field studies in, the Dermaptera and Orthoptera found in the southeastern States. About the time we were able to begin laboratory work on the first season's collecting, other series from the same general region were placed in our hands, since which time an increasing amount of data has become available bearing on the same subject. We feel the most advisable method of making available to workers the really great amount of distributional, synonymic and variational information now in hand, to be the publication of this single large paper. The authors' time has been given more or less regularly for a period of two years to the preparation of this paper and others made necessary by collections referred to herein. It should be borne in mind that the present paper is not a final one, but instead a contribution based on available material, although nearly all of the species known from the regions studied are treated.

In general, the geographic area covered by the collections here studied is, the Coastal Plain and Piedmont regions from the Potomac River south to north-central (non-peninsular) Florida, west to the western boundary of Georgia. In addition a fair amount of material from the higher elevations in Georgia, from certain localities in central Florida and also from Maryland and other more northern States has been included. Aside from the Georgia mountain region records, which are geographically very important, those from outside the main area covered by the paper have been included to place on record the extreme geographic limits of certain species, or to cite material used in the detailed discussion on the species.

In the study of certain genera here treated we have found it not only desirable, but necessary, to revise completely those groups as found within North America, in the course of which work practically all the available collections bearing on the subjects have been examined. These revisions consumed much time and involved some travel. The collections of the United States National Museum, the Museum of Comparative Zoology and the Georgia State Collection

and the private series of Mr. W. T. Davis and Prof. A. P. Morse have furnished a great amount of important data, although the greater portion of our information has been derived from our own collections. The genera which have required comprehensive revisionary study are *Cariblatta*, *Scudderia*, *Amblycorypha*, *Neoconocephalus*, *Orchelimum*, *Conocephalus*, *Atlanticus*, *Cycloptilum*, *Cryptoptilum*, *Gryllus* and *Miogryllus*.

Many data have been accumulated in the course of the studies here presented, which show the necessity of revisionary work in a number of other genera, but, unfortunately, either material or time is lacking at present to consider properly or thoroughly these groups; we have, however, given summaries of such general conclusions as we have reached in these cases, the contributions being presented as abstracts of detailed studies we have in preparation or contemplation, or as accumulations of important general conclusions for the use of other workers. Such contributions will be found under *Nomotettix*, *Neotettix*, *Tettigidea*, *Pardalophora*, *Hippiscus*, *Schistocerca*, *Melanoplus*, and the Group Anaxiphites with particular reference to *Anaxipha*.

The total number of specimens from the area under consideration examined in the preparation of this paper is 14,402, representing 251 species and geographic races, belonging to 100 genera. Of these species nine are here described as new, but a number of other new forms in the recently studied genera were based on material comprising portions of the series here recorded. In the text of this paper forty specific names and that of one genus have been placed in the synonymy, the completeness of the present material, with the consequent clearer appreciation of specific variation and character constancy, making the sinking of these names necessary. No synonymy has been established without several careful checkings of the evidence. Of the specimens examined, 7,294, or about one-half, were collected by the authors, chiefly in July, August and September, 1911 and 1913. The other principal sources of material, with the number of specimens examined from each, are as follows:

Collection of W. T. Davis.....	1,071
Georgia State Collection.....	877
Collection of A. P. Morse.....	784
United States National Museum Collection.....	703
Cornell University Collection.....	636
Hebard Collection (other than Rehn and Hebard collecting).....	611
Academy of Natural Sciences of Philadelphia Collection (other than Rehn and Hebard collecting).....	211



Smaller series have also been examined belonging to the North Carolina Department of Agriculture, the Museum of the Brooklyn Institute of Arts and Sciences, the Pennsylvania State Department of Zoology and the Museum of Comparative Zoology. The necessity of seeing the historic Scudder Collection in the latter institution, to which three visits were made while preparing the present paper, is always very pressing in work on the North American species of the Orthoptera.

In order to reduce the length of our entries and yet give complete data, we have used in the present paper, as in a number of previous ones, standard abbreviations for the sources of the material, or, in the case of the larger series which can be located by the collector's name we have considered the latter sufficient to place the specimens.

No location is given for material collected by Rehn and Hebard, jointly or individually, as it is understood it is in the Philadelphia collections, either the Academy of Natural Sciences or the Hebard Collection. Material in the collection of Mr. W. T. Davis, of New Brighton, New York, collected by himself, and that of Dr. A. P. Morse, of Wellesley, Massachusetts, collected by the same individual, has no location given for it, as it is understood such material is in their respective collections unless otherwise specified. Material collected by other individuals in the Davis and Morse Collections has the location indicated by the abbreviations given below. No location is given for material credited as collected by Dr. J. Chester Bradley, it being understood that is in the Georgia State Collection at Atlanta unless from localities in the Okefenokee Swamp, in which case it is in the collection of Cornell University. From each of these collections a representation has been retained in the Philadelphia collections in return for the work of identification.

The abbreviations for the source of material used through the present paper are as follows:

- A. N. S. P., for the Academy of Natural Sciences of Philadelphia.
- B. I., for the Museum of the Brooklyn Institute of Arts and Sciences.
- Cornell Univ., for the collection of Cornell University.
- Davis Cln., for the collection of Mr. W. T. Davis, of New Brighton, Staten Island, New York.
- Ga. St. Cln., for the Georgia State Collection, located at Atlanta.
- Hebard Cln., for the Hebard Collection, in Philadelphia.
- M. C. Z., for the Museum of Comparative Zoology, at Cambridge, Massachusetts.
- Morse Cln., for the collection of Prof. A. P. Morse, of Wellesley, Massachusetts.

N. C. St. Dept. Agr., for the collection of the North Carolina State Department of Agriculture at Raleigh.

Pa. St. Dept. Zool. Cln., for the collection of the Pennsylvania State Department of Zoology at Harrisburg.

U. S. N. M., for the United States National Museum at Washington.

In the references to the authors as collectors they are indicated by the initials R. and H.

#### LOCALITIES.

To facilitate the placing of localities given in the body of the paper we have tabulated alphabetically under States the localities represented by fair series. The elevations given have been taken from Government topographical charts, official lists of elevations or our own aneroid determinations. In a few cases we have been unable to secure information on the elevation, in which case the fact is so stated. In addition, localities at or very near the sea-level have no elevation given. The dates given are those for the specimens examined and the location is that of the ownership of the same.

##### *Virginia.*

- Arlington, Alexandria County, elevation about 200 feet. VII, 9, 1914. (H.)  
 Falls Church, Fairfax County, elevation 364 feet. V, 25, 1913. (A. N. Caudell.) [U. S. N. M.]  
 Fredericksburg, Spotsylvania and Stafford Counties, elevation about 10 to 250 feet. VII, 20, 1913. (R. & H.)  
 Lynchburg, Campbell County, elevation about 700 feet. VII, 22, 1913. (R. & H.)  
 Glencarlyn, Alexandria County, elevation 183 feet. IV, 27, 1913. (A. N. Caudell.) [U. S. N. M.]  
 Orange, Orange County, elevation 500 to 800 feet. VII, 21, 1913. (R. & H.)  
 Petersburg, Dinwiddie County, elevation about 100 feet. VII, 23, 1913. (R. & H.)

##### *North Carolina.*

- Charlotte, Mecklenburg County, elevation 670 to 750 feet. VII, 27, 1913. (R. & H.)  
 Fayetteville, Cumberland County, elevation 100 to 150 feet. IX, 9, 1911. (R. & H.)  
 Goldsboro, Wayne County, elevation 110 feet. VII, 25, 1913. (R. & H.)

- Greensboro, Guilford County, elevation 900 feet. VII, 26, 1913. (R. & H.)  
 Lake Waccamaw, Columbus County, elevation 60 feet. IX, 8, 1911. (R. & H.)  
 Murphy, Cherokee County, elevation 1,540 feet. VII, 25, 1903. (Morse.) [Morse Cln.]  
 Raleigh, Wake County, elevation 350 feet. Various dates, collectors and collections.  
 Southern Pines, Moore County, elevation 519 feet. XI, 1908 and 1905. (A. H. Manec.) [N. C. Dept. Agr.]  
 Tryon, Polk County, elevation 1,090 feet. (W. F. Fiske.) [U. S. N. M.]  
 Weldon, Halifax County, elevation 70 feet. VII, 24, 1913. (R. & H.)  
 Wilmington, New Hanover County. IX, 8, 1911. (R. & H.)  
 Winter Park, New Hanover County. IX, 7, 1911. (R. & H.)  
 Wrightsville, New Hanover County. IX, 7, 1911. (R. & H.)

##### *South Carolina.*

- Ashley Junction, Charleston County. VIII, 15, 1913. (R.)  
 Columbia, Richland County, elevation 300 feet. VII, 28, 1913. (R. & H.)  
 Denmark, Bamberg County, elevation 257 feet. VIII, 15, 1903. (Morse.) [Morse Cln.]

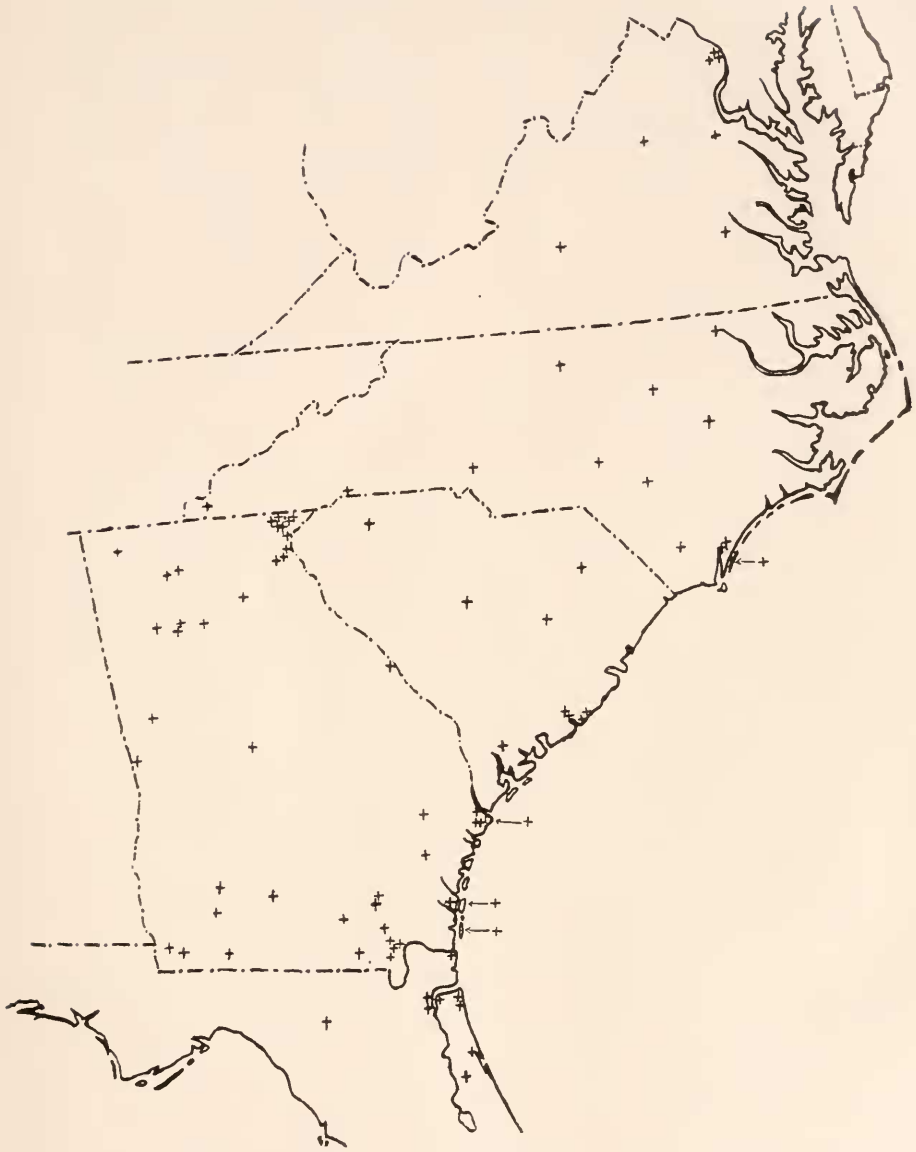


Fig. 1.—Outline map of the southeastern United States, showing the positions of the principal localities, represented by series, in the collections studied in connection with this paper.

- Florence, Florence County, elevation 138 feet. IX, 6, 1911. (R. & H.)
- Isle of Palms, Charleston County. VIII, 15, 1913. (R.)
- Magnolia, Charleston County. IX, 5, 1911. (R. & H.)
- Manning, Clarendon County, elevation 91 feet V, 1914. (Witmer Stone.) [A. N. S. P.]
- Spartanburg, Spartanburg County, elevation 875 feet. VIII, 6, 1913. (H.)
- Sullivan Island, Charleston County. IX, 5, 1911. (R. & H.)
- Yemassee, Hampton and Beaufort Counties, elevation 18 to 40 feet. IX, 4, 1911. (R. & H.)
- Georgia.*
- Albany, Dougherty County, elevation 184 feet. VIII, 1, 1913. (R. & H.)
- Atlanta, Fulton County, elevation 900 to 1,050 feet. Numerous dates and collectors. [Ga. St. Cln.]
- Augusta, Richmond County, elevation 140 to 200 feet. VII, 29, 1913. (R. & H.)
- Austell, Cobb County, elevation 900 to 1,000 feet. VIII, 6, 1910. [Ga. St. Cln.]
- Bainbridge, Decatur County, elevation 110 feet. Numerous dates. (J. Chester Bradley.) [Ga. St. Cln.]
- Billy's Island, Okefenokee Swamp, Charlton County. V and VI, 1912, IX and XII, 1913. (J. Chester Bradley.) [Cornell University.]
- Black Rock Mountain, Rabun County, elevation 2,000 to 3,500 feet. V, 20 to 25, 1911. [Ga. St. Cln.]
- Brunswick, Glynn County. II, 12, 1911. [Ga. St. Cln.] VII, 30, 1911. (R. & H.)
- Buckhead, Fulton County, elevation 1,000 feet. IV, 16, 1911. [Ga. St. Cln.] VIII, 2, 1913. (R. & H.)
- Burton, Rabun County, elevation 1,800 feet. V, 21, 1911. (J. Chester Bradley.) [Ga. St. Cln.]
- Chase Prairie, Okefenokee Swamp, Charlton County. IX, 5, 1913. (J. Chester Bradley.) [Cornell Univ.]
- Clayton, Rabun County, elevation 2,000 to 3,700 feet. VI. (Davis.) [Davis Cln.]
- Columbus, Muscogee County, elevation 200 to 350 feet. VII, 16, 1913. (J. Chester Bradley.) [Ga. St. Cln.]
- Cornelia, Habersham County, elevation 1,500 feet. V, 28, 1906. [Ga. St. Cln.] VII, 1910. (Davis.) [Davis Cln.]
- Cumberland Island, Camden County. VIII, 31, 1911. (R. & H.)
- Currahee Mountain, Stephens County, elevation 1,700 feet. VIII, 5, 1913. (H.)
- Dalton, Whitfield County, elevation 1,000 to 1,200 feet. VIII, 7, 1913. (R.)
- De Witt, Mitchell County, elevation cannot be ascertained. VIII, 19, 1912. [Ga. St. Cln.]
- Fargo, Clinch County, elevation 116 feet. VIII, 31, 1913. (J. Chester Bradley.) [Cornell Univ.]
- Groveland, Bryan County, elevation cannot be ascertained. VII, 28, 1913. (J. Chester Bradley.) [Ga. St. Cln.]
- Hebardville, Ware County, elevation about 150 feet. V, 15, 1915. (H.)
- Homerville, Clinch County, elevation 176 feet. VIII, 27, 1911. (R. & H.)
- Honey Island, Okefenokee Swamp, Charlton County. VI, 1912. (J. Chester Bradley.) [Cornell Univ.]
- Isle of Hope, Chatham County. IX, 3, 1911. (R. & H.)
- Jesup, Wayne County, elevation 100 to 125 feet. IX, 1, 1911. (R. & H.)
- Jasper, Pickens County, elevation 1,200 to 1,500 feet. VIII, 5, 1913. (R.)
- Macon, Bibb County, elevation 350 feet. VII, 30 to 31, 1913. (R. & H.)
- Mixon's Hammock, Okefenokee Swamp, Charlton County. V, 16, 1915. (H.)
- Okefenokee Swamp (general label), Ware, Charlton and Clinch Counties: V, 1911. (J. Chester Bradley.) [Cornell Univ.]
- Pinnacle Peak, Rabun County, elevation 4,100 feet. VIII, 20, 1913. (J. Chester Bradley.) [Ga. St. Cln.]
- Rabun Bald, Rabun County, elevation 4,000 to 4,800 feet. VIII, 21, 1913. (J. Chester Bradley.) [Ga. St. Cln.]
- Sandfly, Chatham County. IX, 3, 1911. (R. & H.)
- Savannah, Chatham County. Various dates, collectors and collections.
- Sharp Mountain, Pickens County, elevation 1,800 to 2,000 feet (barometric).<sup>1</sup> VIII, 6, 1913. (R.)

<sup>1</sup> This peak is about nine miles to the westward of Jasper and should not be confused with Sharp-top Mountain near the same place. The latter peak is higher than Sharp Mountain and is to the eastward of Jasper. Sharp-top Mountain was visited by Morse in 1903.

- Spring Creek, Decatur County, elevation about 110 feet. Numerous dates. (J. Chester Bradley.) [Ga. St. Cln.]
- Stone Mountain, De Kalb County, elevation 1,050 to 1,686 feet. Vicinity of same, elevation 950 to 1,050 feet. VIII, 3, 1913. (R. & H.)
- St. Simon's Island, Glynn County, IV to V, 1911 and 1912. (J. Chester Bradley.) [Ga. St. Cln.] VIII, 30, 1911. (R. & H.)
- Suwanee Creek, Lot 328, 12th District, Okefenokee Swamp, Charlton County. VIII, 28, 1911. (R. & H.)
- Tallulah Falls, Rabun County, elevation 1,630 feet. VIII, 1887. [U. S. N. M. and Hebard Cln.] VII, 1910. (Davis.) [Davis Cln.]
- Thomasville, Thomas County, elevation 250 feet. Various dates. (H. and R. & H.)
- Thompson's Mills, Jackson County, elevation cannot be ascertained. Various dates. (H. A. Allard.) [U. S. N. M.]
- Tifton, Tift County, elevation 370 feet. IX, 8, 1910. [Ga. St. Cln.]
- Toccoa, Stephens County, elevation 1,094 feet. VIII, 4, 1913. (H.)
- Tuckoluge Creek, Rabun County, elevation 1,600 to 2,600 feet. VII, 1910. (Davis.) [Davis Cln.]
- Tybee Island, Chatham County. IX, 2, 1911. (R. & H.)
- Warm Springs, Meriwether County, elevation 850 to 1,200 feet. VIII, 9 to 10, 1913. (R.)
- Wayeross, Ware County, elevation 138 feet. VIII, 11, 1903. (Morse.) [Morse Cln.]
- Wilson Gap, Mountain City, Rabun County, elevation cannot be ascertained. VIII, 22, 1913. (J. Chester Bradley.) [Ga. St. Cln.]

#### Florida.

- Atlantic Beach, Duval County. VIII, 24 to 25, 1911. (R. & H.)
- Fernandina, Nassau County. (W. H. Finn.) [U. S. N. M.]
- Hastings, St. John County. Various dates. (A. J. Brown.) [Morse Cln.]
- Indian River, Volusia and Brevard Counties. 1896. (T. J. Priddey.) [Hebard Cln.]
- Jacksonville, Duval County. Various dates, collectors and collections. Examined by authors, VIII, 25, 1911.
- Live Oak, Suwanee County, elevation 100 to 120 feet. VIII, 26, 1911. (R. & H.)
- Ortega, Duval County. IX, 6, 1913. (Davis.) [Davis Cln.]
- Pablo Beach, Duval County. IX, 5, 1913. (Davis.) [Davis Cln.]
- South Jacksonville, Duval County. IX, 7, 1913. (Davis.) [Davis Cln.]
- St. Augustine, St. John County. XI, 8, 1911. (G. P. Englehardt.) [B.1.]

#### DISTRIBUTIONAL SUMMARY.

Two important influences or sets of factors quite evidently control the distribution of the Dermaptera and Orthoptera in the area studied, these influences being the same which largely control the character of the biota of any region. The two are: physiography and immediate environment; temperature and climatic regions or life-zones. The two influences share equally in controlling the distribution of certain species, but in numerous cases one and not the other is the governing factor. It seems best, therefore, to summarize our distributional generalizations separately under each of the main divisions. We must always bear in mind that a fauna is not a fixture, but a complex constantly changing and modifying, either through the evolution of its own living components or the modification of its own limitations by readjustment of its physical or climatic barriers. Of the first grouping the effect of immediate environment is best studied in a relatively circumscribed area and, other things being equal, the occurrence of the environment is controlled by the



more broadly influencing factor of the physiography of the land. The physiographic divisions we here use are those which are correlated with the distribution of groups of species of the orders studied.

*Physiographic Regions.*

The physiographic regions we find correlated with the distribution of the species found in Virginia, North Carolina, South Carolina, Georgia and northern Florida are:

- a. High Appalachian summits.
- b. Lower summits of the Appalachian uplift and higher valleys of the same area.
- c. Piedmont.
- d. Coastal Plain. This is divisible into two sections which we have for convenience called the Upper Coastal and the Lower Coastal.
- e. Maritime and estuarine region.

These regions may be roughly delimited as follows:

*High Appalachian Summits.*—Only the highest peaks of the North Carolina and Virginia mountains are embraced in this term. Very few Orthoptera have been taken in this region.

*Lower Summits and Valleys of the Appalachian Uplift.*—Comprising the greater (remaining) portion of the Southern Appalachian system to its disappearance in Alabama, and the typical mountain valleys, as opposed to the broad intrusive Piedmont valleys, are grouped under this heading. The Georgia mountains, having in general a lower elevation than the major portion of the North Carolina mountain area, lack a number of the species found in the latter region, and also on their lower portions shelter species more typical of the Piedmont. Other species, which also occur in the Georgia mountains, penetrate the valleys of the North Carolina mountains, but do not frequent the main ridges in the latter State.

*Piedmont.*—This division includes the area of the Piedmont peneplain, or the region from the base of the Appalachians down to the fall-line, also embracing some of the larger and broader valleys which penetrate into the mountainous region proper. The fall-line extends in a curve from the vicinity of Washington, District of Columbia, to Columbus, Georgia.

*Coastal Plain.*—All the area situated below (*i.e.*, coastward of) the fall-line is embraced in this grouping. It is, from the Orthopteran evidence, distinctly divisible into two portions which may for convenience be called the Upper and Lower Coastal Plain regions. The Upper region covers all the territory of the Coastal Plain situated

to the north and inland of a line drawn from the vicinity of Newbern, North Carolina, to the vicinity of Albany, Georgia, passing a short distance inland of Wilmington, North Carolina, Charleston, South Carolina, and Savannah, Georgia. The territory on the coastal side of this line, except the very limited section included in the next

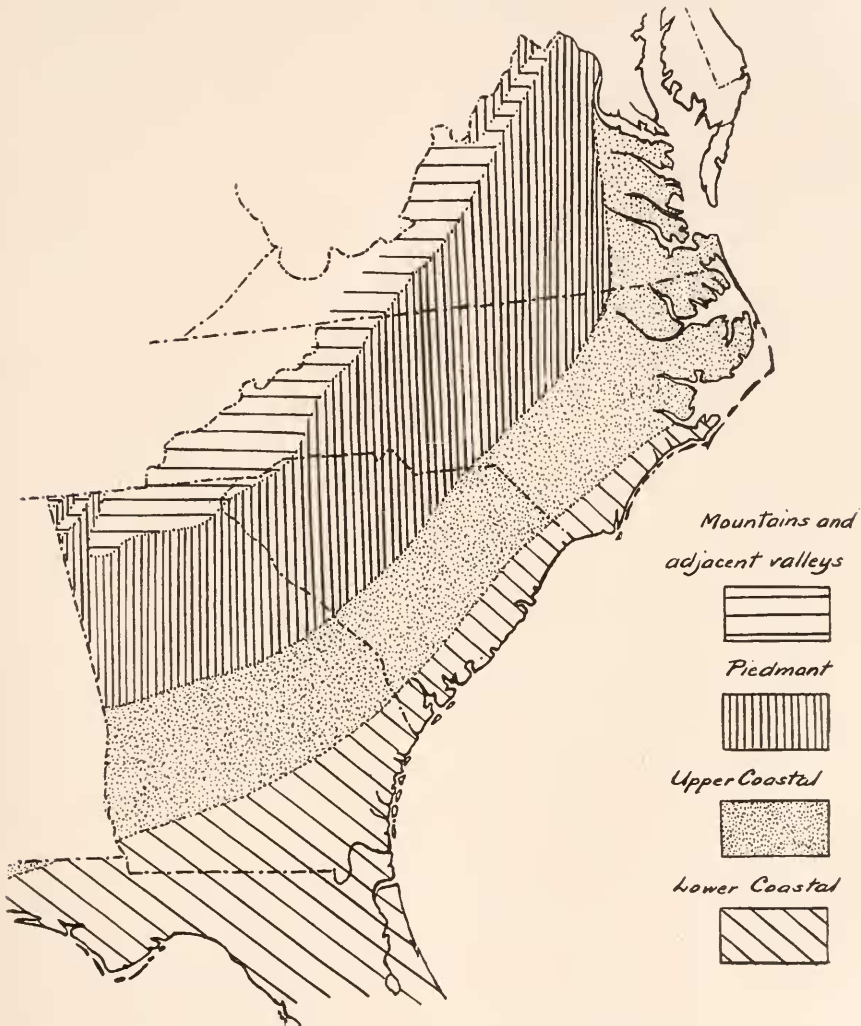


Fig. 2.—Outline map of the southeastern United States, showing the more extensive physiographic regions here discussed. The limited areas treated under "High Mountain Summits" and the very narrow "Sea-coast and Estuarine" region are not indicated.

area, we would consider the Lower Coastal Plain, which condition passes southward into peninsular Florida. The western boundary of the Lower Coastal Plain influence is not fixed as yet.

*Maritime and Estuarine Region.*—We include under this, barrier beach and coastal sand dunes, salt marshes and the extensive fresh marshes of the larger estuaries. The region is limited to a distance of a few miles from the coast-line, except in the case of the estuaries.

The following tabulations of species have been made on the basis of their distribution in relation to the physiographic features of the region studied.

### I. General.

*Labia minor* (Probably introduced.)  
*Blattella germanica* (Introduced.)

*Blatta orientalis* (Introduced.)  
*Nemobius carolinus carolinus*

### II. Appalachians (except high summits) to coast.

*Neotettix femoratus* (Up to 5,500 feet elevation in North Carolina.)

*Paratettix cucullatus*

*Orphulella pelidna* (Up to 5,000 feet in North Carolina.)

*Arphia xanthoptera*

*Arphia sulphurea* (Up to 5,700 feet in North Carolina.)

*Dissosteira carolina* (Up to 4,500 feet in North Carolina.)

*Schistocerca serialis* (Up to 5,700 feet in North Carolina.)

*Scudderia furcata furcata* (Up to 3,800 feet in North Carolina.)

*Conocephalus fasciatus*

*Conocephalus brevipennis*

*Ellipes minuta*

*Myrmecophila pergandci*

*Gryllus assimilis* (Up to 4,500 feet in North Carolina.)

*Ecanthus angustipennis* (Up to 4,000 feet in North Carolina.)

*Ecanthus quadripunctatus* (Up to 4,000 feet in North Carolina.)

### III. Appalachian valleys and lower mountains in Georgia to coast.

*Oligonyx scudderi*

*Tettigidea armata*

*Truxalis brevicornis*

*Amblytropidia occidentalis*

*Pardalophora phenicoptera*

*Trimerotropis citrina*

*Ecanthus latipennis*

*Neoxabca bipunctata*

*Phylloscyrtus pulchellus*

### IV. High Appalachian summits only.

*Nomotettix cristatus cristatus*

*Podisma glacialis variegata*

*Melanoplus divergens*

### V. Mountains only (summits and adjacent valley localities) in southeastern States.

*Cryptocercus punctulatus*

*Diapheromera carolina*

*Acyridium hancocki*

*Chorthippus curtipennis* (Northward occurring Piedmont and Coastal.)

*Pardalophora apiculata*

*Paratytopidia beutenmuelleri*

*Melanoplus similis*

*Melanoplus deceptus*

*Melanoplus sylvestris*

*Melanoplus walshii*

*Neoconocephalus ensiger* (Northward occurring Piedmont and Coastal.)

*Conocephalus allardi*

*Atlanticus monticola*

*Ceuthophilus lapidicola*

*Ecanthus nigricornis*

## VI. Mountains and Piedmont.

*Anisomorpha ferruginca*  
*Acrydium arenosum angustum* (Northward occurring Coastal.)  
*Acrydium ornatum*  
*Neotettix proavus*  
*Eritettix simplex* (Northward occurring Coastal.)  
*Orphulella speciosa* (Northward occurring Coastal.)  
*Chlaenius conspersa* (Northward occurring Coastal.)  
*Encyrtolophus sordidus* (Northward occurring Coastal.)  
*Hesperotettix brevipennis* (Northward occurring Coastal.)  
*Trimerotropis saratilis*  
*Melanoplus tribulus* (Northward occurring Coastal.)  
*Melanoplus devius*  
*Melanoplus decoratus*

*Melanoplus luridus luridus* (Northward occurring Coastal.)  
*Melanoplus punctulatus punctulatus* (Northward occurring Coastal.)  
*Amblycorypha rotundifolia rotundifolia* (Northward occurring Coastal, passing at lower elevations in South-eastern States toward *A. r. parvipennis*.)  
*Pterophylla camellifolia camellifolia* (Northward occurring Coastal.)  
*Conocephalus nemoralis*  
*Atlanticus davisi*  
*Ceuthophilus uhleri* (Northward occurring Coastal.)  
*Ceuthophilus gracilipes*  
*Nemobius fasciatus fasciatus* (Occurring Coastal northward.)  
*Nemobius maculatus*  
*Ecanthus niveus* (Northward occurring Coastal.)

## VII. Lower Mountains, Piedmont and Upper Coastal Plain.

*Nomotettix cristatus compressus*  
*Chortophaga viridifasciata* (To Sullivan Island, South Carolina.)  
*Melanoplus carnegiei* (To Yemassee, South Carolina.)

*Melanoplus femur-rubrum femur-rubrum*  
*Melanoplus femoratus*  
*Orchelimum vulgare*  
*Hapithus agitator agitator*

## VIII. Lower Mountains and Piedmont Region south to southwestern Georgia and adjacent northern Florida, absent from all or most of Carolinian and low Georgian Coastal.

*Diapheromera femorata* (To Monticello, Florida.)  
*Spharagemon bolli* (To Tallahassee, Florida.)  
*Melanoplus scudderi scudderi* (To Monticello, Florida.)  
*Melanoplus atlantis* (To Marianna, Florida.)

*Melanoplus impudicus* (To Spring Creek, Georgia.)  
*Conocephalus saltans* (To Thomasville and Spring Creek, Georgia.)  
*Atlanticus americanus* (To Tallahassee and River Junction, Florida.)

## IX. Piedmont Region.

*Doru aculeatum*  
*Ischnoptera pensylvanica pensylvanica* (Occurring Coastal northward.)  
*Ischnoptera uhleriana uhleriana* (Occurring Coastal northward.)  
*Ischnoptera insolita*  
*Schistocerca damnifica damnifica* (Occurring Coastal northward.)  
*Campylacantha olivacea* (Macon, Georgia, only.)  
*Melanoplus impiger* (Augusta, Georgia, only.)  
*Atlanticus testaceus* (Occurring Coastal northward.)

*Ceuthophilus latens*  
*Ceuthophilus spinosus* (Occurring Coastal northward.)  
*Ceuthophilus neglectus* (Occurring Coastal northward.)  
*Nemobius griseus funeralis* (Macon, Georgia, only.)  
*Nemobius bruneri*  
*Nemobius confusus*  
*Ecanthus exclamationis* (Raleigh, North Carolina, only.)  
*Ecanthus pini* (Raleigh, North Carolina, only.)

## X. Piedmont and Coastal Plain only to extreme northern Florida.

*Acrydium arenosum arenosum*  
*Melanoplus strumosus* (To De Funiak  
 Springs, Florida.)

*Hadenococcus puteanus*  
*Anaxipha exigua*  
*Cyrtoripha columbiana*

## XI. Piedmont and Coastal Plain to peninsular Florida.

*Vostox brunneipennis*  
*Ischnoptera deropeltiformis*  
*Ischnoptera johnsoni*  
*Ischnoptera coultoniana*  
*Ischnoptera borealis*  
*Ischnoptera bolliana* (Northward only  
 to Raleigh, North Carolina.)  
*Periplaneta americana*  
*Chorisoncra texensis* (Northward only  
 to Tryon, North Carolina.)  
*Stagmomantis carolina*  
*Tettigidea lateralis lateralis* (At higher  
 elevations and northward in Coastal  
 Plain passing into *T. l. parvipennis*.)  
*Mermiria alacris* (Northward only to  
 Newbern, North Carolina.)  
*Syrbula admirabilis*  
*Dichromorpha viridis*  
*Romalea microptera* (Northward only  
 to central North Carolina.)  
*Leptysma marginicollis* (Northward  
 only to vicinity of Washington,  
 District of Columbia.)  
*Melanoplus luridus keeleri* (At higher  
 elevations and northward passing  
 into *M. l. luridus*.)  
*Paroza clavuligera* (Local in Pied-  
 mont.)

*Scudderia texensis*  
*Amblycorypha uhleri* (Coastal alone  
 northward.)  
*Microcentrum rhombifolium*  
*Neoconocephalus robustus crepitans*  
 (Northward Coastal only and pass-  
 ing into *N. r. robustus*.)  
*Neoconocephalus triops*  
*Orchelimum agile*  
*Orchelimum minor* (Northward Coastal  
 only.)  
*Odontoxiphidium apterum* (Extending  
 as high as Sand Mountain and Blue  
 Ridge, Georgia, but only north to  
 Fayetteville, North Carolina.)  
*Camptonotus carolinensis*  
*Gryllotalpa hexadactyla*  
*Tridactylus apicalis* (Data poor.)  
*Cycloptilum squamosum* (North Caro-  
 lina northward Coastal only.)  
*Nemobius ambiguus* (North only to  
 Florence, South Carolina.)  
*Anurogryllus muticus* (Northward  
 Coastal only.)  
*Gryllus domesticus*  
*Miogryllus verticalis*  
*Orocharis saltator* (Northward Coastal  
 only.)

## XII. Piedmont and Coastal Plain in northern area of Southeastern States only.

*Melanoplus confusus* (South to Have-  
 lock, North Carolina.)  
*Amblycorypha oblongifolia* (South to  
 Weldon, North Carolina, and Chat-  
 tanooga, Tennessee.)  
*Amblycorypha floridana carinata* (South  
 of fall line in South Carolina and  
 Georgia passing into *A. f. floridana*;  
 northward Coastal only.)

*Conoccephalus strictus* (South to Raleigh  
 and Newbern, North Carolina.)  
*Atlanticus pachymerus* (South to Have-  
 lock, North Carolina, and "South  
 Carolina.")  
*Nemobius palustris* (Only Coastal in  
 region, south to Wilmington, North  
 Carolina; Piedmont northward.)

## XIII. Coastal Plain to peninsular Florida.

*Anisolabis annulipes*  
*Labidura bidens*  
*Prolabia unidentata*  
*Ischnoptera divisa*  
*Ischnoptera uhleriana fulvescens* (North  
 only to southeastern Virginia.)

*Cariblatta lutea lutea* (North only to  
 northern North Carolina.)  
*Manomera tenuescens* (North only to  
 northern North Carolina.)  
*Neotettix bolteri*



- Paxilla obsca* (North only to eastern North Carolina.)  
*Tettigidea prorsa* (To northern Florida.)  
*Radinotatum brevipenne brevipenne* (North only to Yemassee, South Carolina; straggler into Piedmont in Georgia.)  
*Climocephalus elegans* (Maritime only northward.)  
*Spharagemon collare wyomingianum*  
*Scirtetica marmorata picta* (In northern North Carolina passing into *S. m. marmorata*.)  
*Psiniidia fenestralis*  
*Schistocerca obscura* (North to Maryland; straggler in Piedmont.)  
*Schistocerca alutacea* (In Tennessee drainage in western North Carolina.)  
*Schistocerca damnifica calidior* (Passing at fall line and north of North Carolina into *S. d. damnifica*.)  
*Eotettix pusillus* (North only to North Carolina; straggler into Piedmont in Georgia.)  
*Hesperotettix floridensis* (North only to Augusta, Georgia; straggler in Piedmont in Georgia.)  
*Melanoplus decorus* (Limited distribution in North Carolina.)  
*Melanoplus australis* (Limited distribution in South Carolina and Georgia.)  
*Melanoplus attenuatus* (Limited distribution, Georgia to North Carolina.)  
*Melanoplus hebardii* (Limited distribution in Georgia.)  
*Melanoplus nubilus* (Limited distribution in North Carolina.)  
*Melanoplus mirus* (Limited distribution in North Carolina.)  
*Melanoplus stegocercus* (Limited distribution in Georgia.)  
*Melanoplus scapularis* (Limited distribution in Georgia.)  
*Melanoplus nigrescens* (Limited distribution in North Carolina and Georgia.)  
*Melanoplus quercus* (Limited distribution in Georgia.)  
*Melanoplus clypeatus* (Limited distribution in Georgia.)  
*Melanoplus punctulatus arboreus* (Passing in Georgia Piedmont and northward in Coastal Plain into *M. p. punctulatus*.)  
*Paroxya atlantica atlantica*  
*Archaea phalangium* (North only to Augusta, Georgia.)  
*Scudderella cuneata* (North only to Raleigh, North Carolina.)  
*Symmetropleura modesta* (North only to Raleigh, North Carolina.)  
*Pterophylla camellifolia intermedia* (Passing in Georgia Piedmont and northward in Coastal Plain into *P. c. camellifolia*.)  
*Pyrgocorypha uncinata* (North only to Raleigh, North Carolina.)  
*Neoconocephalus exiliscanorus* (Straggler in Georgia Piedmont from Upper Coastal Plain.)  
*Neoconocephalus caudellianus*  
*Neoconocephalus palustris*  
*Orchelimum glaberrimum*  
*Orchelimum laticauda* (Straggler in Georgia Piedmont.)  
*Orchelimum militare*  
*Orchelimum superbum* (Virginia and New Jersey only.)  
*Conocephalus stidomeres* (South only to Raleigh, North Carolina.)  
*Cryptotilum antillarum* (North only to Alamance County, North Carolina.)  
*Cryptotilum trigonipalpus* (North only to Petersburg, Virginia; straggler in Georgia Piedmont.)  
*Nemobius fasciatus socius* (North only to Raleigh, North Carolina, northward and in southern Piedmont passing into *N. f. fasciatus*.)  
*Nemobius cubensis cubensis*  
*Anaxipha pulicaria* (North only to Raleigh, North Carolina.)  
*Falcicula hebardii* (Straggler in North Carolina Piedmont.)

#### XIV. Lower Coastal Plain in the Carolinas, Georgia and extreme northern Florida.

- Nototettix cristatus arcuatus* (Passing northward and higher into *N. c. compressus* and southward into *N. c. floridanus*.)  
*Melanoplus furcatus* (Georgia and Florida only.)  
*Scudderella curvicauda laticauda* (Gradually intergrading northward and higher into *S. c. curvicauda*.)  
*Orchelimum bradleyi* (North to Wilmington, North Carolina.)  
*Atlanticus dorsalis* (North to "South Carolina.")  
*Atlanticus calcaratus* (Georgia and Florida only.)  
*Scapteriscus vicinus* (Georgia only.)  
*Scapteriscus alectus* (Georgia only.)  
*Nemobius palustris aurantius* (Georgia only.)

## XV. Lower Coastal Plain into peninsular Florida.

<i>Ischnoptera nigricollis</i> (Not north of Georgia.)	<i>Melanoplus rotundipennis</i> (Not north of Georgia.)
<i>Ceratinoptera diaphana</i> (Not north of Georgia.)	<i>Melanoplus femur-rubrum propinquus</i> (Passing at the Georgia and South Carolina fall line into <i>M. f. femur-rubrum</i> ; not typical north of Wilmington, North Carolina.)
<i>Eurycotis floridana</i> (Not north of Georgia.)	<i>Aptenopedes sphenarioides sphenarioides</i> (Not north of Georgia.)
<i>Periplaneta australasiae</i> (Not north of Florida.)	<i>Aptenopedes aptera</i> (Not north of Georgia.)
<i>Periplaneta brunnea</i> (Not north of Georgia.)	<i>Belocephalus subapterus</i> (North to South Carolina.)
<i>Pycnoscelus surinamensis</i> (Not north of Florida.)	<i>Belocephalus davisii</i> (Not north of Georgia.)
<i>Gonatista grisea</i> (North to South Carolina.)	<i>Neoconocephalus velox</i> (Not north of Georgia.)
<i>Thesprotia graminis</i> (Not north of Georgia.)	<i>Atlanticus gibbosus</i> (Straggler into Georgia Piedmont.)
<i>Anisomorpha buprestoides</i> (North to South Carolina.)	<i>Ceuthophilus latibuli</i> (Not north of Georgia.)
<i>Paratettix rugosus</i> (Not north of Georgia.)	<i>Scapteriscus abbreviatus</i> (Not north of Georgia.)
<i>Tettigidea spicata</i> (Not north of Georgia.)	<i>Anaxirpha vittata</i> (Not north of Georgia.)
<i>Mermiria bivittata</i>	<i>Hapithus agitator quadratus</i> (Inland and northward passing into <i>H. a. agitator</i> .)
<i>Arphia granulata</i>	<i>Hapithus brevipennis</i> (Not north of Georgia.)
<i>Chortophaga australior</i> (North to Savannah, Georgia.)	
<i>Spharagemon crepitans</i> (Not north of Georgia.)	
<i>Stenacris vitreipennis</i>	
<i>Gymnoscirtetes pusillus</i> (Not north of Georgia.)	

## XVI. Maritime and Estuarine Element.

<i>Anisolabis maritima</i>	<i>Orchelimum concinnum</i>
<i>Mermiria intertexta</i>	<i>Orchelimum fidicinum</i>
<i>Orphulella olivacea</i>	<i>Conocephalus aigialis</i>
<i>Orphulella halophila</i> (Southern Florida.)	<i>Conocephalus nigropleuroides</i>
<i>Trimerotropis maritima</i>	<i>Conocephalus spartina</i>

In table II, we have given as a matter of information the elevation of the upper limit of distribution, where this is exactly known. Table III covers forms occurring in the larger Appalachian valleys, as far north as North Carolina or the lower mountains in Georgia, or both, to the coast, exclusive of the Maritime and Estuarine Region. In table V appear species which considerably modify their physiographic distribution elsewhere in the eastern United States, and this fact is there, and in subsequent tables, indicated in parentheses. In table VIII, we have endeavored to express a peculiar type of distribution: one covering the lower mountains and Piedmont and, although absent from most or all of the Coastal Plain, extending south into southwestern Georgia or even into the adjacent portion of northern Florida.

The more interesting generalizations drawn from the physiographic summaries are the following. Northward numerous species, characteristic of the Piedmont in the area here treated, pass to the Coastal Plain of that region, frequently, or rather generally, leaving the Piedmont. The explanation of this is apparently temperature control and the distribution is typical of the Upper Austral life-zone. Toward the southern end of the Piedmont region numerous forms, characteristic of this section in the Carolinas, enter the lower mountains, doubtless as valley intrusions; this also can be explained by temperature control and is zonal in character. Along the coastal side of the Piedmont in Georgia, a number of Coastal Plain species penetrate the Piedmont for considerable distances to points such as Warm Springs, vicinity of Stone Mountain, Thompson's Mills, Toccoa and even to suitable situations on the slopes of Currahee Mountain, an outlying knob near Toccoa. This is quite marked in the case of Warm Springs, which has seven species of this category occurring there.<sup>2</sup> The extending influence of the larger river valleys, such as the Savannah, Oconee, Ocmulgee, Flint and Chattahoochee, is doubtless responsible for these intrusions, for such they are is evidenced by the known distribution of the species elsewhere and the generic habitat. The division of the Coastal Plain into two areas has abundant evidence in its favor in the Orthoptera, as the tabulations show. It is significant also that quite a few of the forms do not reach into peninsular Florida. Further studies on the distribution of central Florida forms of the orders will doubtless throw much additional light on the fixity of these limitations. It is possible that a lack of material may be partly responsible for the apparent restriction of these ranges. In the case of the divisions of the Coastal Plain, our material is sufficiently full to show the correlations very clearly.

#### Life Zones.

The life zones represented in the area studied are the following:

- a. Boreal or Canadian.
- b. Transition or Alleghanian.
- c. Upper Austral or Carolinian.
- d. Lower Austral or Austroriparian.
- e. Basic Austral or Sabalian.<sup>3</sup>

<sup>2</sup> These are: *Cariblatta lutea lutea* (also Thompson's Mills), *Radinotatum brevipenne*, *Scirtetica marmorata picta*, *Eotettix pusillus*, *Hesperotettix floridensis*, *Atlanticus gibbosus* (also on Currahee Mountain) and *Cryptoptilum trigonipalpus* (also vicinity of Stone Mountain).

<sup>3</sup> For remarks on this zone see p. 104.

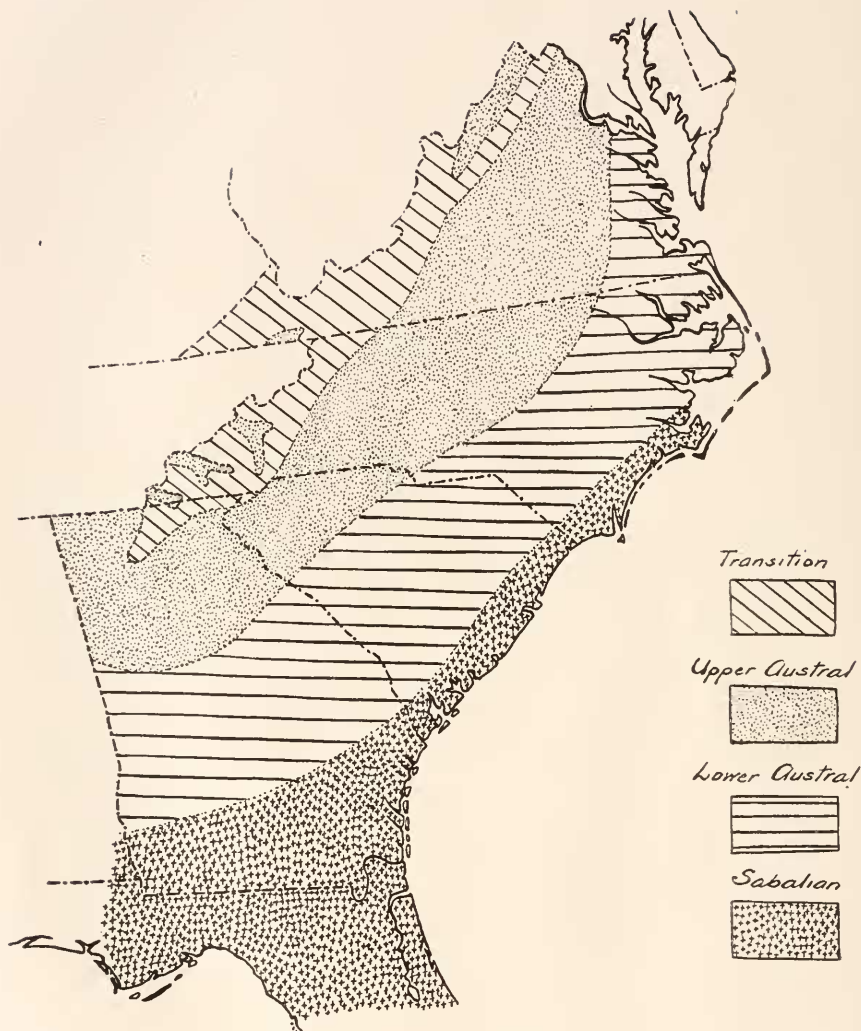


Fig. 3.—Outline map of the southeastern United States, showing the extent of the principal life zones. The circumscribed Boreal areas on the mountains of North Carolina and Virginia have not been indicated. For comments upon and definition of the Sabalian zone see the zonal distributional information in the introductory portion of this paper. The extent of the Sabalian, as well as the other zones to the west of the Georgia-Alabama line and the Chattahoochee River, has not been determined by us.

The zones may be briefly outlined as follows:<sup>4</sup>

*Boreal or Canadian Zone.*—This zone occupies the summits of the higher mountains in North Carolina and Virginia, such as the Black Mountains, Roan Mountain, Grandfather Mountain, Mt. Pisgah, Balsam Mountains, etc. This is the area of balsam forests within the territory studied. We do not feel that the zone has been sufficiently studied to consider the total number of species reported from it as a fair index of the Orthoptera therein.

*Transition or Alleghanian Zone.*—This zone comprises all the truly mountainous country below the Boreal summits; in Georgia, however, being largely restricted to the elevations greater than 1,500 feet. Slope exposure is largely responsible for the presence or absence of this element near its upper and lower margins. In North Carolina, large valleys of tributary streams of the Tennessee carry tongues of the Upper Austral for considerable distances into the otherwise solidly Transition country. The same appears to be true to a lesser degree in the Transition area of Georgia, which is in large part much tinctured with Upper Austral elements.

*Upper Austral or Carolinian.*—The area comprised in this zone extends from the lower border of the Transition zone down to a line roughly drawn from a short distance up stream of the mouth of the Potomac River, to Weldon, North Carolina, to Raleigh and Charlotte, North Carolina, traversing transversely the area between Spartanburg and Columbia, South Carolina, and crossing the State of Georgia in a southwesterly direction to the vicinity of Warm Springs, Georgia, then curving northwest into Alabama. As stated above, pronounced valley intrusions of this fauna enter western North Carolina from the Tennessee Valley, while in Georgia it apparently pushes its way well into and even up the lower slopes of the mountains, apparently in sharp competition with the Transition forms occurring in the same region. The two elements will be governed in their distribution, at one of their points of contact, by slope exposure; at another, by the normal cover or by the burning-over of the land. As we have discussed above under Physiography, a number of distinctly Lower Austral forms occur within normally Upper Austral areas, at localities such as Currahee Mountain, Toccoa, vicinity of Stone Mountain and Thompson's Mills, and these extensions probably are, as suggested there, due to the extending influence of large river valleys, which provide

<sup>4</sup> For a careful presentation of the life zones of North Carolina, see Brimley, *Journ. Elisha Mitchell Scient. Soc.*, XXIX, pp. 19 to 27, (1913).



avenues of entrance to suitable environments in a region in general characterized by a different fauna. The fact that these extensions occur only, as far as known, at a few localities gives support to this explanation.

*Lower Austral or Austroriparian.*—This zone covers the area situated below (*i.e.*, in elevation) the Upper Austral, down to a line extending from the southern portion of Pamlico Sound, North Carolina, to Lake Waccamaw, North Carolina, to Yemassee, South Carolina, then swinging in a curve to Albany, Georgia, and the Chattahoochee River west of the last-mentioned locality. A few forms, which we would consider more representative of the Upper Austral zone, occur as stragglers within this area at localities such as Goldsboro and Fayetteville, North Carolina, Sumter and Florence, South Carolina, Augusta and Macon, Georgia. It is possible that future work may show these forms to be equally characteristic of the Lower Austral; a very questionable possibility to our minds. In these cases, the interdigitation which we have mentioned as occurring at the upper limit of the Lower Austral is probably repeated in the reverse direction, but physiographic control features are probably responsible for these intrusions.

*Basic Austral or Sabalian.*—The present zone, which is co-extensive with the physiographic area called Lower Coastal by us, we find is so decidedly characterized by a considerable number of species, which extend southward to southern or at least to central or north-central Florida, that we have been compelled to give it a name. We have found no term in the literature which we could use, so we here propose the name Sabalian. The name has been derived from the technical name of the cabbage palmetto (*Sabal palmetto*), which is probably the most striking tree of the region named, and whose distribution is co-extensive with that area.

The Sabalian zone is characterized by at least six species, outside of those occurring only in central and southern Florida, which are also West Indian in distribution or extremely close to West Indian species.

The zone extends from the coast-line inland to the lower boundary of the Lower Austral, given above in defining that region, north to the region of Pamlico Sound and south into Florida. It is narrow in the Carolinas, but becomes broad in Georgia and its exact extent to the westward remains to be worked out. The exact line where this same influence gives way to the Tropical in southern Florida has not been critically mapped, owing to the need of more information

from the central and south-central portions of the peninsula. The information from the Tropical area of southern Florida is relatively full.

The zonal distribution of the species treated in the present paper is tabulated below. In some cases it is known that the species, in certain regions of North America, occur in zones other than those here checked, but, unless this has a distinct bearing on the possible occurrence of the species in the same zone in the region here studied, we have not indicated its presence other than as found in the southeastern States. In a few cases where species will in all probability be found in a certain zone in the southeastern States, judging by the analogy of other regions, or where the form is found in two zones, but by defect of the record is not known from one situated between these two, we have inserted a check for that life zone with a brief qualification.

DERMAPTERA.	Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<b>LABIDURIDÆ.</b>					
<i>Anisolabis annulipes</i> .....			1 (part)	1	1
<i>Anisolabis maritima</i> .....			1	1	1
<i>Labidura bidens</i> .....				1	1
<b>LABIIDÆ.</b>					
<i>Vostox brunneipennis</i> .....			1	1	1
<i>Labia minor</i> .....	Introduced-range nearly general.				
<i>Prolabia unidentata</i> .....				1	1
<b>FORFICULIDÆ.</b>					
<i>Doru aculeatum</i> .....			1		
<b>ORTHOPTERA.</b>					
<b>BLATTIDÆ.</b>					
<i>Ischnoptera deropeltiformis</i> .....			1	1	1
<i>Ischnoptera nigricollis</i> .....					1
<i>Ischnoptera johnsoni</i> .....			1	1	1
<i>Ischnoptera p. pensylvanica</i> .....		1	1		
<i>Ischnoptera divisa</i> .....			1 (part)	1	
<i>Ischnoptera coulouiana</i> .....			1	1	1
<i>Ischnoptera u. uhleriana</i> .....			1		
<i>Ischnoptera u. fulvescens</i> .....				1	1
<i>Ischnoptera borealis</i> .....			1	1	1
<i>Ischnoptera bolliana</i> .....			1	1	1
<i>Ischnoptera insolita</i> .....			1		
<i>Blattella germanica</i> .....	Introduced-range general.				
<i>Ceratinoptera diaphana</i> .....					1
<i>Cariblatta l. lutea</i> .....				1	1
<i>Eurycotis floridana</i> .....					1
<i>Blatta orientalis</i> .....	Introduced-range general.				
<i>Periplaneta americana</i> .....			1	1	1
<i>Periplaneta australasiae</i> ...					1

	Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<i>Periplaneta brunnea</i> .....					1
<i>Pycnoscelus surinamensis</i> ..					1
<i>Chorisonera texensis</i> .....				1	1
<i>Cryptocercus punctulatus</i> ...		1	1 (strag- gler)		
<b>MANTIDÆ.</b>					
<i>Stagmomantis carolina</i> .....			1	1	1
<i>Gonatista grisca</i> .....					1
<i>Oligonyx scudderi</i> .....			1	1	1
<i>Thesprotia graminis</i> .....				1	1
<b>PHASMIDÆ.</b>					
<i>Diapheromera femorata</i> .....		1	1	1 (part)	1 (part)
<i>Manomera tenuescens</i> .....				1	1
<i>Anisomorpha buprestoides</i> ..					1
<i>Anisomorpha ferruginea</i> .....			1	1	
<b>ACRIDIDÆ.</b>					
<i>Nomotettix c. cristatus</i> .....	1	1			
<i>Nomotettix c. compressus</i> ...			1		
<i>Nomotettix c. arcuatus</i> .....				1	1
<i>Acrydium a. arenosum</i> .....				1	1
<i>Acrydium a. angustum</i> .....		1	1		
<i>Acrydium ornatum</i> .....		1	1		
<i>Neotettix proavus</i> .....			1		
<i>Neotettix femoratus</i> .....		1	1		1
<i>Neotettix bolteri</i> .....				1	1
<i>Paratettix rugosus</i> .....					1
<i>Paratettix cucullatus</i> .....		1	1	1	1 (part)
<i>Pezilla obesa</i> .....				1	1
<i>Tettigidea prorsa</i> .....				1	1
<i>Tettigidea spicata</i> .....					1
<i>Tettigidea l. lateralis</i> .....			1 (part)	1	1
<i>Tettigidea armata</i> .....			1	1	1
<i>Radinotatum b. brevipenne</i> ..				1	1
<i>Truxalis brevicornis</i> .....			1	1	1
<i>Mermiria alacris</i> .....			1 (part)	1	1
<i>Mermiria intertexta</i> .....				1	1
<i>Mermiria bivittata</i> .....				1	1
<i>Syrbula admirabilis</i> .....			1	1	1
<i>Eritettix simplex</i> .....			1		
<i>Amblytropidia occidentalis</i> ..			1	1	1
<i>Orphulella pelidna</i> .....		1	1	1	1
<i>Orphulella olivacea</i> .....			1	1	1
<i>Orphulella speciosa</i> .....		1	1		
<i>Dichromorpha viridis</i> .....			1	1	1
<i>Clinoccephalus elegans</i> .....				1	1
<i>Chloeallia conspersa</i> .....	1	1	1 (part)		
<i>Chorthippus curtispennis</i> ....	1	1			
<i>Arphia xanthoptera</i> .....		1	1	1	1
<i>Arphia granulata</i> .....				1	1
<i>Arphia sulphurea</i> .....		1	1	1	1
<i>Chortophaga viridifasciata</i> ..		1	1	1	1 (part)
<i>Chortophaga australior</i> .....					1
<i>Encoptolophus sordidus</i> .....		1	1		
<i>Pardalophora phœnicoptera</i> ...			1	1	1
<i>Hippiscus rugosus</i> .....			1	1	1
<i>Dissosteira carolina</i> .....		1	1	1	1

Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<i>Spharagemon crepitans</i> .....				1
<i>Spharagemon bolli</i> .....	1	1	1	1 (part)
<i>Spharagemon collare wyo- mingianum</i> .....			1	1
<i>Scirtetica marmorata picta</i> ..			1	1
<i>Psinidia fenestralis</i> .....			1	1
<i>Trimerotropis maritima</i> .....	1 (part)	1 (part)	1 (part)	1 (part)
<i>Trimerotropis citrina</i> .....		1	1	1
<i>Trimerotropis saxatilis</i> .....	1	1		
<i>Romalca microptera</i> .....			1	1
<i>Stenacris vitreipennis</i> .....				1
<i>Leptygma marginicollis</i> .....		1	1	1
<i>Schistocerca obscura</i> .....		1	1	1
<i>Schistocerca alutacea</i> .....		1 (part)	1	1
<i>Schistocerca scriatilis</i> .....	1	1	1	1
<i>Schistocerca d. damnifica</i> ...		1		
<i>Schistocerca d. calidior</i> .....			1 (part)	1
<i>Gymnosirtetes pusillus</i> .....				1
<i>Campylacantha olivacea</i> .....		1	1	
<i>Eotettix pusillus</i> .....			1	1
<i>Eotettix signatus</i> .....				1
<i>Hesperotettix floridensis</i> .....			1 (part)	1
<i>Hesperotettix b. brevipennis</i>		1		
<i>Hesperotettix b. pratensis</i> ...				1 (part)
<i>Paratylotropidia beuten- mucleri</i> .....	1 (location provisional)			
<i>Melanoplus similis</i> .....	1			
<i>Melanoplus decipiens</i> .....	1			
<i>Melanoplus decorus</i> .....				1
<i>Melanoplus australis</i> .....				1
<i>Melanoplus attenuatus</i> .....			1	1
<i>Melanoplus hcbardi</i> .....				1
<i>Melanoplus nubilus</i> .....			1	
<i>Melanoplus tribulus</i> .....		1		
<i>Melanoplus devius</i> .....	1	1		
<i>Melanoplus decoratus</i> .....	1	1		
<i>Melanoplus rotundipennis</i> ..				1
<i>Melanoplus stegocercus</i> .....				1
<i>Melanoplus mirus</i> .....			1	
<i>Melanoplus scapularis</i> .....				1
<i>Melanoplus strumosus</i> .....		1 (part)	1	1
<i>Melanoplus sylvestris</i> .....	1			
<i>Melanoplus carnegiei</i> .....	1	1	1 (part)	
<i>Melanoplus s. scudderi</i> .....		1	1	1 (part)
<i>Melanoplus walshii</i> .....	1	1 (part)		
<i>Melanoplus nigrescens</i> .....				1
<i>Melanoplus querneus</i> .....				1
<i>Melanoplus atlantis</i> .....	1	1	1	1 (part)
<i>Melanoplus f. femur-ru- brum</i> .....	1	1	1 (part)	
<i>Melanoplus f. propinquus</i> ..			1 (part)	1
<i>Melanoplus impudicus</i> .....		1	1	
<i>Melanoplus impiger</i> .....			1	
<i>Melanoplus confusus</i> .....		1	1	1 (part)
<i>Melanoplus l. luridus</i> .....	1	1 (part)		
<i>Melanoplus l. keeleri</i> .....		1 (part)	1	1
<i>Melanoplus femoratus</i> .....	1	1 (part)	1 (part)	
<i>Melanoplus furcatus</i> .....				1
<i>Melanoplus clypeatus</i> .....				1

	Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<i>Melanoplus p. punctulatus</i>			1		
<i>Melanoplus p. arboreus</i> .....				1	1 (part)
<i>Paroxya a. atlantica</i> .....			1 (part)	1	1
<i>Paroxya clavuligera</i> .....			1	1	1
<i>Aptenopedes s. sphenari- oides</i> .....					1
<i>Aptenopedes aptera</i> .....					1

## TETTIGONIIDÆ.

<i>Arethaea phalangium</i> .....				1 (part)	1
<i>Stilpnochlora marginella</i> ....					1
<i>Scudderia c. curvicauda-c. laticauda</i> .....			1		
<i>Scudderia c. laticauda</i> .....				1	1
<i>Scudderia terensis</i> .....			1	1	1
<i>Scudderia f. furcata</i> .....	1		1	1	1
<i>Scudderia cuneata</i> .....				1	1
<i>Symmetropleura modesta</i> ...				1	1
<i>Amblycorypha oblongifolia</i> ...			1		
<i>Amblycorypha f. floridana</i> ...					1
<i>Amblycorypha f. carinata</i> ....			1	1	
<i>Amblycorypha uhleri</i> .....			1	1	1
<i>Amblycorypha r. rotundi- folia</i> .....	1		1 (part)		
<i>Amblycorypha r. r.-r. par- vipennis</i> .....			1 (part)	—	1 (part)
<i>Microcentrum rhombifo- lium</i> .....			1	1	1
<i>Microcentrum retinerve</i> .....			1	1	1
<i>Pterophylla c. camellifolia</i> ...	1		1		
<i>Pterophylla c. intermedia</i> ...				1	?
<i>Belocephalus subapterus</i> .....					1
<i>Belocephalus davisi</i> .....					1
<i>Pyrgocorypha uncinata</i> .....				1	1
<i>Neoconocephalus exilis- canorus</i> .....			1		
<i>Neoconocephalus robustus crepitans</i> .....			1	1	1
<i>Neoconocephalus caudell- ianus</i> .....					1
<i>Neoconocephalus velox</i> .....					1
<i>Neoconocephalus retusus</i> ....			1	1	1
<i>Neoconocephalus triops</i> .....			1	1	1
<i>Homorocoryphus malivo- lans</i> .....				1 (part)	1
<i>Orchelimum agile</i> .....			1	1	1
<i>Orchelimum glaberrimum</i> ....				1	1
<i>Orchelimum vulgare</i> .....	1		1	1 (part)	
<i>Orchelimum laticauda</i> .....			1	1	1
<i>Orchelimum minor</i> .....			1	1	1
<i>Orchelimum concinnum</i> .....			1 (part)	1 (part)	1 (part)
<i>Orchelimum fidicinium</i> .....				1 (part)	1 (part)
<i>Orchelimum militare</i> .....				1	1
<i>Orchelimum bradleyi</i> .....					1
<i>Orchelimum superbum</i> .....				1 (part)	
<i>Conocephalus allardi</i> .....		1			
<i>Conocephalus f. fasciatus</i> ...	1	1	1	1	1
<i>Conocephalus brevipennis</i> ...		1	1	1	1
<i>Conocephalus nemoralis</i> .....			1		



	Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<i>Conocephalus strictus</i> .....			1 (part)	1 (part)	
<i>Conocephalus stictomerus</i> ....			1 (part)	1 (part)	
<i>Conocephalus aigialus</i> .....				1 (part)	1 (part)
<i>Conocephalus nigropleu- roides</i> .....				1 (part)	1 (part)
<i>Conocephalus spartinae</i> .....				1 (part)	1 (part)
<i>Conocephalus saltans</i> .....			1	1	1 (part)
<i>Odontoxiphidium apterum</i> ..			1 (part)	1	1
<i>Atlanticus testaceus</i> .....		1 (not in region)	1 (part)		
<i>Atlanticus pachymerus</i> .....			1 (part)	1	
<i>Atlanticus davisi</i> .....		1 (part)	1 (part)		
<i>Atlanticus monticola</i> .....	1	1			
<i>Atlanticus americanus</i> .....		1	1	1 (part)	
<i>Atlanticus gibbosus</i> .....			1 (part)	1	1
<i>Atlanticus dorsalis</i> .....					1
<i>Atlanticus calcaratus</i> .....					1
<i>Camptonotus carolinensis</i> ..			1	1	1
<i>Hadenocercus putcanus</i> .....		1	1	1	1
<i>Ceuthophilus uhleri</i> .....		1	1		
<i>Ceuthophilus latibuli</i> .....					1
<i>Ceuthophilus gracilipes</i> .....		1	1		
<i>Ceuthophilus lapidicola</i> .....		1	1		
<i>Ceuthophilus latens</i> .....			1		
<i>Ceuthophilus sallei</i> .....					1
<i>Ceuthophilus spinosus</i> .....			1		
<i>Ceuthophilus neglectus</i> .....			1		

## GRYLLIDÆ.

<i>Gryllotalpa hexadactyla</i> .....		1 (?)	1	1	1
<i>Scapteriscus vicinus</i> .....					1
<i>Scapteriscus alectus</i> .....					1
<i>Scapteriscus abbreviatus</i> .....					1
<i>Tridactylus apicalis</i> .....		1 (elsewhere)	1 (elsewhere)	1	1
<i>Ellipes minuta</i> .....		1	1	1	1
<i>Myrmecophila pergandei</i> .....		1	1	1	1
<i>Cryptoptilum antillarum</i> ....				1	1
<i>Cryptoptilum trigonipal- pum</i> .....				1	1
<i>Cycloptilum squamosum</i> .....			1	1	1
<i>Nemobius f. fasciatus</i> .....		1	1		
<i>Nemobius f. socius</i> .....				1	1
<i>Nemobius maculatus</i> .....		1	1		
<i>Nemobius griseus funeralis</i>				1	
<i>Nemobius ambitiosus</i> .....			1 (part)	1	1
<i>Nemobius bruneri</i> .....			1		
<i>Nemobius c. cubensis</i> .....			1	1	1
<i>Nemobius p. palustris</i> .....			1 (part)	1 (part)	1 (part)
<i>Nemobius p. aurantius</i> .....					1
<i>Nemobius c. carolinus</i> .....	1	1	1	1	1
<i>Nemobius confusus</i> .....			1		
<i>Anurogryllus muticus</i> .....			1	1	1
<i>Gryllus assimilis</i> .....		1	1	1	1
<i>Gryllus domesticus</i> .....			1	1	1
<i>Miogryllus verticalis</i> .....			1	1	1
<i>Occanthus niveus</i> .....		1	1		
<i>Occanthus exclamationis</i> .....			1		
<i>Occanthus angustipennis</i> ....		1	1	1	1
<i>Occanthus quadripunctatus</i> ..		1	1	1	1
<i>Occanthus nigricornis</i> .....		1	1 (elsewhere)		

	Boreal.	Transi- tion.	Upper Austral.	Lower Austral.	Sabalian.
<i>Oecanthus pini</i> .....			1		
<i>Oecanthus latipennis</i> .....			1	1	1 (part)
<i>Neoxabea bipunctata</i> .....			1	1	1
<i>Anaxipha exigua</i> .....			1	1	1
<i>Anaxipha pulicaria</i> .....				1	1
<i>Anaxipha vittata</i> .....					1
<i>Falcicula hebardii</i> .....			1	1	1
<i>Cyrtoxipha columbiana</i> .....			1	1	1
<i>Phylloscyrtus pulchellus</i> .....			1	1	1
<i>Hapithus a. agitator</i> .....			1 (part)	1 (part)	
<i>Hapithus a. quadratus</i> .....				1 (part)	1
<i>Hapithus brevipennis</i> .....					1
<i>Orocharis saltator</i> .....			1	1	1

*Physiographic and Zonal Factors Compared.*

When the physiographic and zonal correlations are contrasted, we find that in Virginia the two factors are largely governed by the same boundaries, the Lower Austral alone not extending up the valley of the Potomac as far as the fall-line, which is the Piedmont-Upper Coastal Plain line. In North Carolina, the increased temperature effect of lower latitudes is evident, as the upper line of the Lower Austral, after following the fall-line, crosses it and ascends to higher country, this tendency increasing in Georgia, where the upper boundary of the same zone is in places as high as a thousand feet above sea level. Conversely, this crossing of the physiographic boundaries by zonal boundaries is found to the northward of the area here treated, where the entire Coastal Plain section of New Jersey and all or at least the greater portion of the Coastal Plain eastern peninsula of Virginia, Maryland and Delaware, is Upper Austral. It has been found in the Middle Atlantic States that many Upper Austral species are limited to southern New Jersey, not occurring above the fall-line. This restriction is probably due to the fact that the southern portion of New Jersey has a more equable winter climate (and consequently a higher sum total annual temperature) than the Piedmont of Pennsylvania, an Upper Austral region. There is also in southern New Jersey an extension of certain elsewhere Lower Austral species, although in the great majority of the forms the region is clearly Carolinian. The control governing the distribution of these species is probably environment, as the sands and gravels of southern New Jersey are in general similar to those of the Coastal Plain to the south.

*Origin of the Orthopterous Fauna of the Southeastern States.*

We have made some tabulations bearing on the probable origin

of the Orthopterous fauna of the region studied. It is essential, however, for a proper understanding of the subject, to have similar data on the fauna of the Gulf Coast and Texas, in order to make definite or conclusive generalizations. The material from which such data can be obtained is now available, but it will be some years before our studies will permit us to make the desired tabulations. In consequence any expressions on the question of origin would be premature and certainly require amplification, if not revision, within a relatively short time, as the Gulf Coast can be expected to supply much of the really vital information on origin and dispersal. We propose, therefore, to discuss at a later date, as a whole, the information on this subject for the Southern States.

## SYSTEMATIC TREATMENT OF SPECIES.

### DERMAPTERA.

#### LABIDURIDÆ.

##### *Anisolabis annulipes* (Lucas).

###### *North Carolina.*

Raleigh, XI, 25, 1904, (C. Pinkus),  
1 ♂, [U. S. N. M.].  
Wrightsville, IX, 7, 1911, (R. & H.),  
1 ♂, 1 ♀.

###### *South Carolina.*

Camden, II, 15 to 25, 1 ♂, [M. C. Z.].  
Columbia, VII, 28, 1913, (R. & H.),  
1 ♀; VIII, 16, 1903, (A. P. Morse),  
1 ♀.  
Charleston, 1 ♀, [M. C. Z.].

###### *Georgia.*

Augusta, VII, 29, 1913, (R. & H.),  
1 juv. ♀.

Macon, VII, 30-31, 1913, (R. & H.),  
1 ♀, 4 juv. ♀.  
Albany, VIII, 1, 1913, (R. & H.), 1 ♀.  
Bainbridge, (J. C. Bradley), 1 juv. ♀.  
Billy's Island, VI, 12, 1912, (J. C.  
Bradley), 1 ♀.  
St. Marys, II, 6 to IV, 16, 1896,  
(O. Bangs), 2 ♀, [Hebard Cln.].

###### *Florida.*

Atlantic Beach, VIII, 25, 1911, (R. &  
H.), 1 ♀.  
Jacksonville, (T. J. Priddey), 1 ♂,  
1 ♀, [Hebard Cln.]; III, 1900, 1 ♂,  
[U. S. N. M.].  
Indian River, 1896, (T. J. Priddey).  
1 ♀, [Hebard Cln.].

We have before us a male specimen taken by the senior author at Philadelphia, on August 9, 1902, in the back yard of the Academy; there is also a female from Washington, District of Columbia, in the National Museum without further data. The species is doubtless widely distributed by commerce; it has in recent years been found to have an extensive distribution throughout the Lower Austral and Subtropical Zones of the southeastern United States.

At two localities the species was found under signs, on oak (Albany) and sweet gum (Augusta). The majority of the above series was found under debris on the ground.

**Anisolabis maritima** (Géné).*Virginia.*

Fortress Monroe, 2 juv. ♀, [U. S. N. M.].

*North Carolina.*

Newbern, (A. S. Bickmore), 1 ♂, (M. C. Z.).

*South Carolina.*

Charleston, 1 ♀, [M. C. Z.].

*Georgia.*

St. Simon's Island, IV-V, 1911-12, (J. C. Bradley), 3 ♀, 1 juv. ♀; VIII, 30, 1911, (R. &amp; H.), 1 juv. ♀.

*Florida.*

Fernandina, (W. H. Finn), 1 juv. ♀, [U. S. N. M.].

Jacksonville, (T. J. Priddey), 1 juv. ♀, [Hebard Cln.].

St. Augustine, (C. W. Johnson), 1 ♀, 1 juv. ♂, [Morse Cln.].

Crescent City, 1 juv. ♀, [U. S. N. M.].

Cedar Keys, 1 juv. ♀, [U. S. N. M.].

Indian River, 1896, (T. J. Priddey), 1 ♀, [Hebard Cln.].

**Labidura bidens** (Olivier).*South Carolina.*

No further data, (A. Agassiz), 1 ♂, [M. C. Z.].

*Georgia.*

Brunswick, V, 2, 1911, (J. C. Bradley), 1 ♂, 1 ♀.

Bainbridge, IX-X, 1910, (J. C. Bradley), 1 ♂, 6 ♀, 3 juv. ♀.

Spring Creek, VI, 7-22, 1911, (J. C. Bradley), 1 juv. ♀; VIII, 26-28, 1913, (J. C. Bradley), 1 ♂, 2 ♀.

*Florida.*

St. Augustine, (C. W. Johnson), 1 juv. ♀, [Morse Cln.].

**LABIIDÆ.****Vostox brunneipennis** (Serville).*Maryland.*

Baltimore, 1 ♀, [M. C. Z.].

*North Carolina.*

Tryon, (W. F. Fiske), 1 ♂, [U. S. N. M.].

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 ♂.

Cave Spring, 1 juv. ♀, [Ga. State Cln.].

Savannah, (W. F. Fiske), 1 ♂, [U. S. N. M.].

Atlanta, VIII, 28, IX, 5, 1910, 2 ♂, 1 ♀, [Ga. State Cln.].

Okefenokee Swamp, V, 9, 1911, (J. C. Bradley), 1 ♀.

*Florida.*

St. Augustine, (C. W. Johnson), 2 ♀, [Morse Cln.].

Palatka, II, 1868, 1 ♂, 1 juv. ♀, [M. C. Z.].

Ormond, 1 ♀, 1 juv. ♀, [M. C. Z.].

Enterprise, V, 17, 1 ♀, [U. S. N. M.].

The normal type in males of this species is one which has a single inner tooth situated at the end of the proximal third of the forceps; one of the males from Atlanta has the inner enlargement of the forceps continued to a point a little distad of the middle, terminating there in a double tooth. At Tryon and Savannah the species was found on oak.

**Labia minor** (Linnæus).

Atlanta, Georgia, XI, 5, 1910, 2 ♂, [Ga. State Cln.].

Unadilla, Ga., VI, 25, 1910, (J. C. Bradley), 1 ♀.

***Prolabia unidentata* (Beauvois).***North Carolina.*

Wilmington, IX, 8, 1911, (R. & H.),  
1 ♂.

Wrightsville, IX, 7, 1911, (R. & H.),  
5 ♂, 2 ♀.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 5 ♂, 1 ♀, 1 juv. ♀.

*Georgia.*

Vienna, VI, 30, 1 ♀, 1 juv. ♀, [Ga. State Cln.].

Spring Creek, VI, 1911, (J. C. Bradley), 1 ♀; VIII, 26-28, 1913, (J. C. Bradley), 3 ♂.

Billy's Island, VI, 1912, (J. C. Bradley), 1 ♂, 5 ♀, 2 juv. ♀; IX, 1-5, 1913, (J. C. Bradley), 1 ♂, 4 ♀, 1 juv. ♂.

Brunswick, II, 12, 1911, 1 ♂, 4 ♀, 1 juv. ♀, [Ga. State Cln.]; VIII, 30, 1911, (H.), 1 ♂, 2 ♀.

*Florida.*

Jacksonville, XI, 3, 1911, (W. T. Davis), 1 ♀.

Appalachicola, (Thaxter), 1 ♂, [M. C. Z.].

Volusia County, II, 10, 1869, (J. A. Allen), 4 ♂, 2 ♀, [Scudder Cln.].

Indian River, 1896, (T. J. Priddey), 1 ♂, 3 ♀, [Hebard Cln.].

Silver Springs, (G. P. Englehardt), 1 ♂, [B. I.].

In the series of males recorded above, we find nine having the forceps with inner teeth both proximad and distad, three having but one arm furnished with a proximal and no distal teeth, two having both arms furnished with proximal but with no distal teeth and one having no teeth whatever, the forceps of this latter specimen, which is from Wilmington, being much like those of the female in contour and curvature but much more slender.

The previous North Carolina records for the species are Raleigh and Boardman, these being the most northern localities at which it has been found. Though usually found under the bark of pine logs, the series from Lake Waccamaw was found under the bark of a prostrate, decaying sweet gum trunk.

**FORFICULIDÆ.*****Doru aculeatum* (Scudder).<sup>5</sup>***North Carolina.*

Morganton, VII, 20, 1903, (A. P. Morse), 1 ♀, 3 juv. ♀.

*Georgia.*

Clayton, VI, 1909, (W. T. Davis), 1 ♂, 7 ♀.

Burton, V, 21, 1911, 1,800 feet, (J. C. Bradley), 1 ♂, 2 ♀.

Austell, VIII, 6, 1910, 1 ♀, [Ga. State Cln.].

Silver Lake, VIII, 10, 1913, (J. C. Bradley), 1 ♀.

Atlanta, VII, 1 ♀, [Ga. State Cln.].

Buckhead, IV, 16, 1911, 1 ♂, 2 ♀ and 2 other adults, (damaged), [Ga. State Cln.]; VIII, 2, 1913, (R. & H.), 1 ♀, 1 juv. ♀.

The only specimens we have taken (Buckhead) were beaten from a heavy growth of high weeds growing along a wet depression.

<sup>5</sup> See Rehn and Hebard, *Jour. N. Y. Ent. Soc.*, XXII, pp. 93 to 95, figs. 5 and 7, (1914).



## ORTHOPTERA.

## BLATTIDÆ.

*Ischnoptera deropeltiformis* (Brunner).*South Carolina.*

Macon, VII, 30-31, 1913, (R. & H.), 1 ♀.  
 Spartanburg, VIII, 6, 1913, (H.), Warm Springs, 850-1,200 ft., VIII, 9-10, 1913, (R.), 1 ♀.

*Georgia.*

Clayton, 2,000 ft., V, 18-26, 1911, (J. C. [Ga. State Cln.]; IV, 22-V, 12, 1911, Bradley), 2 ♂; VI, 1909, (W. T. (J. C. Bradley), 1 ♂.  
 Davis), 1 ♂, 1 ♀.  
 Cornelia, V, 28, 1906, 1 ♂, [Ga. State Cln.].  
 Hebardville, V, 15, 1915, (H.), 1 ♀.

The males of this species show considerable variation in size, certain individuals examined since the previous minimum measurements were given by us<sup>6</sup> being considerably smaller than those cited. The two smallest males seen measure as follows:

	Length of body.	Length of pronotum.	Greatest width of pronotum.	Length of tegmen.	Greatest width of tegmen.
Key West, Fla.....	12.2 mm.	3.2 mm.	4.0 mm.	12.6 mm.	3.7 mm.
St. Simon's Island, Ga.....	11.8 "	3.2 "	4.1 "	13.2 "	4.0 "

From an examination of fifty specimens of the species, the specimens of minimum size appear to be found only in Florida and the coastal region of Georgia, the individuals from higher elevations being uniformly larger. Specimens of similar size to those found in the more elevated regions of Georgia, Virginia and the Carolinas occur, however, in the area where the minimum individuals are found. All of the present adult individuals have pale femora.

The above specimens taken by us were found under dead oak leaves (Macon), running on the ground in pine and oak woods (Warm Springs) and under debris in garden (Hebardville).

*Ischnoptera nigricollis* Walker.*Georgia.**Florida.*

Spring Creek, VI, 7-23, 1911, (J. C. Sanford, (S. B. Fraser), 2 ♂, [Hebard Bradley), 1 ♀.  
 Cln.].

The exact relationship of this form to *I. deropeltiformis* is still somewhat problematical. It seems possible that it may be a "saltation" from the *deropeltiformis* stock, developing in Florida and southern Georgia, but apparently nowhere else. Whatever the origin of *nigricollis* may be, its distinctive coloration almost always permits its ready recognition.

<sup>6</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 415, (1910).

The Spring Creek record is the first exact one for the species from Georgia.

**Ischnoptera johnsoni** Rehn.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 1 ♂, 3 ♀.

*Alabama.*

Pyriton, Clay County, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 2 ♀.

Atlanta, VI, 23, 1910, 1 ♂, [Ga. State Cln.].

St. Simon's Island, VIII, 30, 1911, (R. & H.), 1 ♀.

The remarks previously made by us<sup>7</sup> on the apparent decrease in size southward in specimens of this species are not substantiated by the more extensive series now available, the lack of sufficient material in 1910, there suggested as a possibility, accounting for our change of view.

The species was taken from under damp dead leaves on the edge of forest (Fredericksburg) and among dry leaves under live oaks (St. Simon's Island).

**Ischnoptera pensylvanica pensylvanica** (De Geer).

Fredericksburg, Virginia, VII, 20, 1913, (R. & H.), 1 ♀.

Pennington Gap, Va., 1 ♀, [M. C. Z.].

Spartanburg, South Carolina, VIII, 6, 1913, (R. & H.), 1 ♀, 5 juv.

Clayton, Georgia, 2,000 ft., V, 18-26, 1911, (J. C. Bradley), 2 ♂; VI, 1909,

(W. T. Davis), 2 ♀.

The evidence of the present collections strengthens our previously formed conclusion regarding the distribution of this species and of *I. divisa*. Apparently the areas occupied by the two are quite distinct, only localities along the line of impingement being represented by both forms. The two Clayton males and one female from the same locality are very deeply colored, but do not appreciably approach *I. pensylvanica inaequalis*.

The above-listed material taken by us was found under signs on trees (white oaks at Fredericksburg).

**Ischnoptera divisa** Saussure and Zehntner.

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.), 20 ♀, 11 juv., 4 oöthecae.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 2 juv.

Goldsboro, VII, 25, 1913, (R. & H.), 1 juv.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 4 ♀, 5 juv.

Albany, VIII, 1, 1913, (R. & H.), 1 ♀.

The present form is clearly a derivative of the *I. pensylvanica* stock, representing an adaptation of that type in the lower country

<sup>7</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 419, (1910).

of the southeastern States as *I. pensylvanica inaequalis* is in the central States. The difference is, however, that positive intergradation is known to exist between *pensylvanica* and *p. inaequalis*, while *divisa* and *pensylvanica* do not intergrade as far as known, both occurring in typical condition at localities where the ranges meet. The northern and western limit of the known range of *divisa* in the southeastern States can be represented by a line extending from Anglesea, Cape May County, New Jersey, to Plummer's Island, Maryland, thence to Augusta and Albany, Georgia, and finally to Rives in northwestern Tennessee. West of the Mississippi we know nothing of the species beyond the North Mexico record of Saussure and Zehntner. Apparently this form trespasses but little into the Piedmont region of the southeastern States and is a distinctly coastal type.

The tegminal characters of the female of this species, previously described by us, are typically represented in all the adult material, although a few specimens have the tegminal apices more rounded than in others. In all, however, the general form of the tegmina is sublanceolate, and the three to five distal segments of the abdomen are always exposed. The pronotal disk varies considerably in depth of coloration in the Petersburg series, being hardly at all infuscate in some specimens and again as solidly so as in *pensylvanica* in others. The division of the disk color is more clearly marked in some of the young than in the adults, and is obsolete in a large proportion of the specimens. All of the adult specimens are within the measurement extremes previously given by us.<sup>8</sup>

All of the above series were taken from under signs, on long-leaf pine (Albany), short-leaf pine and sweet gum (Augusta) and red oak and short-leaf pine (Petersburg). At the latter locality immature individuals were about as plentiful as adults; only one adult was found on pine, the species, at that place at least, preferring the red oak.

**Ischnoptera coulöniana** Saussure.

*North Carolina.*

Charlotte, VII, 27, 1913, (R. & H.),  
1 ♀.  
Goldsboro, VII, 25, 1913, (R. & H.),  
1 ♀, 1 juv.  
Winter Park, IX, 7, 1911, (R. & H.),  
1 juv.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 9 juv.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 2 ♀.  
Columbia, VII, 28, 1913, (R. & H.),  
1 ♀.  
Florence, IX, 6, 1911, (R. & H.),  
1 juv.

<sup>8</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 432, (1910).

*Georgia.*

Clayton, VI, 1909, (W. T. Davis), 1 ♂.  
 Atlanta, VII, 29, 1910, 1 ♂, 3 ♀,  
 [Ga. State Cln.].  
 Stone Mountain, VIII, 16, 1913, (J. C.  
 Bradley), 1 ♀.  
 Egypt, (W. H. Finn), 1 ♀, [U. S.  
 N. M.].

Macon, VII, 30-31, 1913, (R. & H.),  
 1 ♀.  
 Bainbridge, (J. C. Bradley), 1 ♀.  
 Spring Creek, VII, 16-29, 1912,  
 (J. C. Bradley), 1 ♂, 2 ♀.

*Florida.*

Ortega, IX, 6, 1913, (W. T. Davis),  
 2 ♀.

The Spring Creek male has the disk of the pronotum decidedly rufescent mesad and moderately infusate laterad, well contrasted with the clear ochraceous lateral sections of the pronotum. The range of the species is now known to extend northward as far as Anglesea, New Jersey (1 ♂; Acad. Nat. Sci. Phila. Cln.), its limits in that direction being much the same as those of *I. divisa*, but in the southeastern States it apparently ranges higher, crossing the Piedmont region and entering the mountainous section (Clayton, Georgia, Sulphur Springs and Tryon, North Carolina).

The specimens listed above secured by the authors were taken from under the bark of dead short-leaf pine (Goldsboro and Florence) and sweet gum logs and stumps (Lake Waccamaw) and from under signs on red oak (Charlotte).

***Ischnoptera uhleriana uhleriana* Saussure.**

Arlington, Virginia, VII, 9, 1914, (H.), 2 ♂, 2 ♀. Clayton, Georgia, 2,000-3,700 feet, VI, 1909, (W. T. Davis), 2 ♂.

The Clayton specimens are typical *uhleriana* and the locality is the most southern from which true *uhleriana* is known. This is also the first record of typical *uhleriana* from Georgia. The Arlington individuals were taken at night on road and resting on woods foliage.

***Ischnoptera uhleriana fulvescens* Saussure and Zehntner.***South Carolina.*

Columbia, VII, 28, 1913, (R. & H.),  
 1 ♀.

*Georgia.*

Macon, VII, 30-31, 1913, (R. & H.),  
 2 ♀, 1 juv.  
 Vienna, VI, 5, 1910, 1 ♂, [Ga. St. Cln.].  
 Brunswick, VIII, 30, 1911, (R. & H.),  
 1 ♂.  
 St. Simon's Island, VIII, 30, 1911,  
 (R. & H.), 1 ♀.  
 Billy's Island, VI-VII, 1912, (J. C.  
 Bradley), 1 ♂, 2 juv.

Honey Island, June 1, 1912, (J. C.  
 Bradley), 4 ♂, 2 ♀, 3 juv.  
 Bainbridge, IX, 3, (J. C. Bradley), 1 ♀.  
 Spring Creek, VI, 7-23, VII, 16-29,  
 1912, (J. C. Bradley), 1 ♂, 1 ♀.

*Florida.*

Ortega, IX, 6, 1913, (W. T. Davis),  
 1 ♀.  
 Atlantic Beach, VIII, 25, 1911, (R. &  
 H.), 1 ♂, 5 ♀.  
 Pablo Beach, IX, 5, 1913, (W. T.  
 Davis), 2 ♀, 2 juv.

The personally collected material listed above was secured from under bark of a pine log (Brunswick), among dead leaves under

live oaks (St. Simon's Island), under same on edge of oak and short leaf-pine woods (Macon) and from under refuse (Atlantic Beach).

***Iscnoptera borealis*** Brunner.

Goldsboro, *North Carolina*. VII, 25, Rabun County, VII, 1910. (W. T. Davis), 3 ♀.  
1913, (R. & H.), 2 ♀. Atlanta, VII, 31, 1910, 1 ♂, [Ga. St. Cln.].

*Georgia*.

Clayton, 2,000–3,700 feet, VI, 1909,  
(W. T. Davis), 1 ♀.

These records are the first for the species from Georgia. At Goldsboro it was found under debris in dead short-leaf pine needles.

***Iscnoptera bolliana*** Saussure and Zehntner.

Clayton, Georgia, 2,000–3,700 feet, VI, Rabun County, Ga., VII, 1910, (W. T. Davis), 1 ♂.  
1909, (W. T. Davis), 1 ♀.

***Iscnoptera insolita*** Rehn and Hebard.

Spartanburg, South Carolina, VIII, 6, 1913, (H.), 1 ♀.

This specimen is perfectly typical of this very rare and little-known species. The tegmina surpass the apex of the abdomen by nearly the pronotal length. Tryon, North Carolina and Spartanburg are the only localities east of the Appalachians at which the species has been taken. The present specimen was secured from under a sign on a tree.

***Blattella germanica*** (Linnaeus).

Atlanta, Georgia, IX, 5, 1910, 1 ♂, Waycross, Georgia, IX, 10, 1910, 1 ♀,  
[Ga. St. Cln.]. [Ga. St. Cln.].

***Ceratinoptera diaphana*** (Fabricius).

Billy's Island, Georgia, VII, 1912, Newberry, Florida, XI, 19, 1911, (W. T. Davis), 1 juv. ♀.  
(J. C. Bradley), 1 juv. ♂, 1 juv. ♀.  
Floyd's Island, Ga., XII, 27–30, 1913,  
(J. C. Bradley), 1 ♀.

The immature specimens are easily determinable, as the distinctive color pattern of the young of this species makes recognition certain. The Billy's Island individual is much more immature than the others, being but little more than half their size.

These records are the most northern ones for this beautiful type, which was previously known from within the United States only from Gainesville, Key West and Long Key, Florida.

***Cariblatta lutea lutea*** (Saussure and Zehntner).

*North Carolina*. Fayetteville, IX, 9, 1911, (R. & H.),  
1 juv.  
Roanoke Island, VII, 25, (G. P. Wrightsville, IX, 7, 1911, (R. & H.),  
Englehardt), 1 ♀, [B. I.]. 1 juv.

*Georgia.*

Warm Springs, VIII, 9-10, 1913, (R.),  
1 ♀, 1 juv.  
Thompson's Mills, (H. A. Allard),  
1 ♂, 1 juv. ♀, [U. S. N. M.].  
Macon, VII, 31, 1913, (R. & H.), 1 ♀.  
Albany, VIII, 1, 1913, (R. & H.), 1 ♀.  
Spring Creek, VI, 7-23, 1911, (J. C.  
Bradley), 3 ♂, 5 ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
1 ♀.

St. Simon's Island, IV, 22-V, 12, 1911,  
(J. C. Bradley), 2 ♀.  
Billy's Island, VI, 1912, (J. C. Brad-  
ley), 2 ♀.  
Suwannee Creek, VIII, 28, 1911,  
(R. & H.), 1 ♀.

*Florida.*

Jacksonville, (T. J. Priddey), 1 ♂, 3 ♀,  
[Hebard Cln.].  
Atlantic Beach, VIII, 25, 1911, (R. &  
H.), 1 juv. ♂.

The adults in this series exhibit considerable variation in the length of the tegmina. Warm Springs is the highest elevation at which this species has been taken.

The insect was found hiding under dead oak leaves (Fayetteville and Macon), under dead needles in long-leaf pine woods (Albany), in wire grass (Suwannee Creek), under refuse (Atlantic Beach) and was beaten from undergrowth in pine and oak woods (Warm Springs).

**Eurycotis floridana** (Walker).*Georgia.*

St. Simon's Island, IX-X, 1910,  
[Ga. St. Cln.]; VIII, 30, 1911, (R. &  
H.), 1 ♂, 3 ♀, 1 juv.  
Billy's Island, IX, 1-5, 1913, (J. C.  
Bradley), 1 ♀.  
St. Marys, III, 6 to IV, 18, 1896,  
(O. Bangs), 2 ♂, [M. C. Z.].

*Florida.*

Fernandina, (W. H. Finn), 1 ♀,  
[U. S. N. M.].  
Jacksonville, XI, 3, 1911, (W. T.  
Davis), 1 ♂, 1 juv.  
Ortega, IX, 6, 1913, (W. T. Davis),  
1 ♂, 1 ♀, 5 juv.  
Inverness, Citrus County, 1892, (C. M.  
Weed), 1 juv., [Hebard Cln.].

The three Georgia records are the first from that State for the species, these also constituting the most northern points from which the species is known. In some of the young the pale lateral margins of the pronotum and mesonotum are decided, but in all of the adults these areas are of the general color.

The present authors found the species under the dead bark of a live oak tree on St. Simon's Island, while the Jacksonville specimens are labelled "in log."

**Blatta orientalis** Linnaeus.

Washington, District of Columbia,  
(Caudell; Pratt), 1 ♂, 1 ♀, [U. S.  
N. M.].

Atlanta, Georgia, VII, 7, 1910. VIII,  
30, 1913, 2 ♂, 1 ♀, [Ga. St. Cln.].

**Periplaneta americana** (Linnaeus).

Atlanta, Georgia, XI, 6, 1909, 1 ♂, [Ga. St. Cln.].

**Periplaneta australasiae** (Fabricius).

Fernandina, Florida, (W. H. Finn), 1  
juv., [U. S. N. M.].

Enterprise, Fla., V, 16, 1 juv., [U. S.  
N. M.].



**Periplaneta brunnea** Burmeister.*Georgia.*

Brunswick, VIII, 31, 1911, (R. & H.),  
2 ♀.  
Billy's Island, VI, 1912, (J. C. Brad-  
ley), 1 ♀.  
Thomasville, I, 3, 1908, (H.), 3 ♂,  
2 ♀, 3 juv.

*Florida.*

Fernandina, (W. H. Finn), 1 ♂,  
[U. S. N. M.].  
Jacksonville, (T. J. Priddey), 2 ♀,  
[Hebard Cln.]; IX, 28, 1913, (W. T.  
Davis), 1 ♀.

All of these specimens belong to "var. *a.*" of Saussure and Zehntner, except the Billy's Island female, which approaches "var. *c.*" There is, however, some variation in the depth of the castaneous general coloring in several of the Thomasville specimens, this also being present in series from other localities in the collections at hand, and is not due to geographic or sexual difference.

The northern limit of distribution of the present species as now known is marked by Bainbridge, Thomasville, Billy's Island and Brunswick, Georgia, but doubtless it is being constantly extended northward by coastwise shipping.

At Brunswick we found this form running on the hotel veranda and at Thomasville it was taken from under signs on oaks.

**Pycnoscelus surinamensis** (Linnaeus).

Jacksonville, Florida, (T. J. Priddey), New Smyrna, Fla., III, 1905, (A. N.  
1 ♀, [Hebard Cln.]. Caudell; bred, adult XI, 1905), 1 ♀,  
Cedar Keys, Fla., (E. Palmer), 1 juv. [U. S. N. M.].  
[M. C. Z.].

**Chorisoneura texensis** Saussure and Zehntner.

1904. *Chorisoneura plocea* Rehn, Ent. News, XV, p. 164. [Coast of South Carolina.]

*North Carolina.*

Tryon, VI, 19, 2 ♂, [U. S. N. M.].

*Florida.*

Atlantic Beach, VIII, 25, 1911, (R. &  
H.), 1 ♂, 1 ♀.

*Georgia.*

St. Simon's Island, IV, 22-V, 12, 1911,  
(J. C. Bradley), 3 ♂, 2 ♀.

Orlando, VI, 7, 1907, 1 ♀, [U. S. N. M.].

Texan series compared with sixteen specimens now before us from the southeastern United States show *plocea* to be a synonym of *texensis*. Rehn, in the absence of Texan material, was led, by ambiguity in the description of *texensis* and confusion in the names of the tegminal veins, to suppose the specimen before him to be different.

The above specimens were taken at light (Tryon), in nests of webworm (Orlando) and beaten from bushes of bayberry, *Myrica cerifera*, growing in and along the edge of pine woods (Atlantic Beach).

The Tryon record is the most northern as well as the most elevated for the species.

**Cryptocercus punctulatus** Scudder.

*Maryland.*

Meadow Mountain, Garrett County, VIII, 1911, (W. Stone), 3 adults, 2 juv., [A. N. S. P.].

*Virginia.*

Hinton, (W. P. Hay), 1 adult, [U. S. N. M.].  
Stone Mountain, (Pollock), 1 adult, [U. S. N. M.].  
Cumberland Mountains, Lee County, VIII, 1879, (H. G. Hubbard), 1 adult, [M. C. Z.].

*Georgia.*

Black Rock Mountain, 3,000 feet, V, 20-25, 1911, 1 juv., [Ga. St. Cln.].

Wilson Gap, Mountain City, VIII, 22, 1913, (J. C. Bradley), 6 adults.  
Clayton, 2,000-3,700 feet, VI, 1909, (W. T. Davis), 4 adults, 2 juv.

*North Carolina.*

Pisgah Forest, VIII, 12, 1908, 2 adults, 1 juv., [U. S. N. M.].  
Blowing Rock, VII, 19, 1903, (A. P. Morse), 5 adults, 1 juv.; VIII, 13, (G. P. Englehardt), 6 adults, [B. I.].  
Linville, VII, 18, 1903, (A. P. Morse), 1 adult, 10 juv.  
Balsam, VII, 23, 1903, (A. P. Morse), 1 adult.

The present records aid very materially in mapping the areal and vertical distribution of this very interesting and peculiar genus and species. The known data from the southeastern States show that it descends as low as from 700 to 1,500 feet (vicinity of Rome, Georgia), while it has been taken as high as 5,500 feet (Old Baldy Mountain, North Carolina).

**MANTIDÆ.**

**Stagmomantis carolina** (Johansson).

1896. *Bactromantis virga* Scudder, Can. Ent., XXVIII, p. 213. [Sanford, Florida.]

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 2 juv. ♂.  
Petersburg, VII, 23, 1913, (R. & H.), 1 juv. ♀.  
Newport News, IX, 16, 1907, (B. Long), 1 ♀, [A. N. S. P.].

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 1 juv. ♂.  
Greensboro, VII, 26, 1913, (R. & H.), 1 juv. ♂.  
Goldsboro, VII, 25, 1913, (R. & H.), 1 juv. ♀.  
Fayetteville, IX, 9, 1911, (R. & H.), 6 ♀.  
Charlotte, VII, 27, 1913, (R. & H.), 2 juv. ♀.  
Winter Park, IX, 7, 1911, (R. & H.), 2 ♂, 1 ♀, 1 juv. ♀.

Wrightsville, IX, 7, 1911, (R. & H.), 2 ♂.  
Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 juv. ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 2 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀.  
Columbia, VII, 28, 1913, (R. & H.), 1 juv. ♂, 2 juv. ♀.  
Ashley Junction, VIII, 15, 1913, (R.), 5 juv. ♂, 3 juv. ♀.  
Yemassee, IX, 4, 1911, (R. & H.), 4 ♂, 2 ♀.

*Georgia.*

Cornelia, VII, 1910, (W. T. Davis), 1 juv. ♂.  
Stone Mountain vic., VIII, 3, 1913, (R. & H.), 1 juv. ♂.  
Augusta, VII, 29, 1913, (R. & H.), 2 juv. ♂.

- Warm Springs, VIII, 9-10, 1913, (R.), 1 juv. ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 3 juv. ♀.  
 Savannah, (A. Oemler), 1 ♀, [U.S.N.M.].  
 Isle of Hope, IX, 3, 1911, (R. & H.), 1 juv. ♀.  
 Sandfly, IX, 3, 1911, (R. & H.), 2 juv. ♀.  
 Tybee Island, IX, 2, 1911, (H.), 1 ♂.  
 St. Simon's Island, VIII, 30, 1911, (R. & H.), 1 ♀, 1 juv. ♂.  
 Brunswick, VIII, 30, 1911, (H.), 1 ♂.  
 Cumberland Island, VIII, 31, 1911, (R. & H.), 1 ♂, 1 ♀.  
 Suwannee Creek, VIII, 28, 1911, (R. & H.), 1 juv. ♀.
- Homerville, VIII, 27, 1911, (R. & H.), 1 juv. ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 3 juv. ♂, 2 juv. ♀.

#### Florida.

- Jacksonville, (T. J. Priddey), 1 ♂, 1 ♀, [Hebard Cln.]; VIII, 25, 1911, (R. & H.), 1 juv. ♀; IX, 5-27, 1913, (W. T. Davis), 3 ♀, 2 juv. ♀.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 2 juv. ♂, 1 juv. ♀.  
 Live Oak, VIII, 26, 1911, (R. & H.), 1 juv. ♂.  
 Sanford, (S. B. Frazer), 1 juv. ♂, TYPE of *Bactromantis virga* Scudder, [Scudder Cln.].

It is surprising to find the unique type of Scudder's *Bactromantis virga* merely a large immature individual of the present species and of the usual type of coloration for its sex. There is no question but that the specimen is Scudder's type, for it bears his label and agrees perfectly with his description in size and coloration. The glaring misstatement in the original description, "apterous female," can only be attributed to carelessness involving the consequent erection of another synonym. The specimen is indeed "apterous," but the wing pads may be seen readily with the naked eye and the most casual examination of the apex of the abdomen shows that it is not a female. As *virga* is the type by monotypy of the genus *Bactromantis*, that genus falls in the synonymy under *Stagmomantis*.

In the above series we find the majority of immature males dark in general coloration, but having the median and caudal limbs green, only two immature examples of this sex are wholly green or greenish. All of the immature females are of this latter phase of coloration.

#### *Gonatista grisea* (Fabricius).

- Morris Island, Charleston Harbor, South Carolina, 1 ♂, [Scudder Cln.].  
 Savannah, Georgia, (A. Oemler), 1 ♀, [U. S. N. M.].
- Fort George, Florida, (R. S. Turner), 1 ♀, [U. S. N. M.].  
 McDonald, Fla., IX, 6, 1905, (C. H. Baker), 1 juv. ♀, [U. S. N. M.].

The specimen from McDonald was taken on a long-leaf pine. The present species is found in moderate numbers throughout the subtropical region of southern Florida and to a much less degree in the Sabalian or Basic Austral zone of the southeastern United States; records to the north of the limits of this zone are surely those of individuals accidentally introduced.

#### *Oligonyx scudderi* Saussure.

1877. *Oligonyx uhleri* Stål, Bih. till K. Svensk. Vet. Akad. Handl., IV, No. 10, p. 66. [Louisiana.]

<i>South Carolina.</i>		Warm Springs, 900 feet, VIII, 10, 1913,
Yemassee, IX, 4, 1911, (H.), 1 juv. ♂.		(R.), 1 juv. ♂.
<i>Georgia.</i>		Albany, VIII, 1, 1913, (R. & H.), 1 ♀.
Dalton, 1,200 feet, VIII, 7, 1913, (R.),		Waycross, VIII, 11, 1903, (A. P.
1, lost.		Morse), 1 juv. ♀.
Sharp Mountain, 1,900 feet, VIII, 6,		<i>Florida.</i>
1913, (R.), 1 juv. ♂.		Crescent City, 1 ♂, [U. S. N. M.].
Buckhead, VIII, 2, 1913, (R. & H.),		Punta Gorda, XI, 14, 1911, 1 ♂,
1 juv. ♀.		[Davis Cln.].

A study of the literature on the genus *Oligonyx* has brought to light several interesting features. In 1870, Saussure briefly described *Oligonyx scudderi*,<sup>9</sup> giving North America as the locality; this is explained by his remark the following year<sup>10</sup> under this species: "Habite. Probablement l'Amérique méridionale (Etiquetée de Georgie, sans doute par erreur)." Later knowledge of the species' distribution shows conclusively that Saussure's type was very probably correctly labelled. In 1877, Stål recorded as this species specimens from Texas, which belong to the western type discussed below, and described *Oligonyx uhleri* from Louisiana as new, stating that this species is "extremely near *scudderi*, something larger, tegmina and wings more obscure, distinctly infuscated, limbs longer." None of these characters are of sufficient importance in this insect to be considered of specific value, for the size and limb length are shown to be variable in the series of 43 adult males before us, and the individuals from the dryer western localities differ only from eastern examples in having the tegmina and wings less darkened and in a few other minor respects. Stål named the more eastern representative, and hence his name falls as an absolute synonym of *O. scudderi*. Saussure and Zehntner have described representatives from Dallas, Texas, and Northern Mexico as *Oligonyx bollianus*,<sup>11</sup> hence the western type, if sufficiently distinct to warrant racial separation, would be called *O. scudderi bollianus* S. and Z.

The species was found running on bare ground (Dalton, Sharp Mountain), on ground in pine and oak woods (Warm Springs), in oak woods (Buckhead), in swampy spot in short-leaf pine woods (Yemassee) and was beaten from wire grass and undergrowth of long-leaf pine woods (Albany).

<sup>9</sup> Mitt. Schw. Ent. Gesellsch., III, p. 239, (1870).

<sup>10</sup> Mem. l'Hist. Nat. Mex., Mant. Amer., p. 121, (1871).

<sup>11</sup> Biol. Cent.-Amer., Orth., I, p. 173, (1894).

***Thesprotia graminis* (Scudder).***Georgia.*

Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 1 ♀.  
 St. Simon's Island, VIII, 30, 1911, (R. & H.), 2 ♀, 1 juv. ♀.  
 Cumberland Island, VIII, 31, 1911, (R. & H.), 1 ♂, 3 ♀.  
 Homerville, VIII, 27, 1911, (R. & H.), 1 ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 1 ♀.

*Florida.*

Jacksonville, IX, 28, 1913, XI, 3, 1911, (W. T. Davis), 3 juv. ♂; VIII, 25, 1911, (R. & H.), 1 ♀.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 1 ♂, 4 ♀.  
 Live Oak, VIII, 10, 1903, (A. P. Morse), 1 ♂, 3 juv.; VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀.  
 Crescent City, 1 ♂, 1 ♀, [U. S. N. M.].  
 Newberry, XI, 18, 1911, (W. T. Davis), 1 ♀.

The largest female before us, 52.4 mm. in length, is from Atlantic Beach. This species is found generally distributed, but never in numbers, in the undergrowth of the pine forests of Georgia and Florida in decided Sabalian (see preface) surroundings. Isle of Hope is the most northern locality recorded for the species, but it will doubtless be found in southern South Carolina and as far northwestward in Georgia as the limit of the Sabalian element. The male from Live Oak was taken when flying through the pine woods, its feeble fluttering flight resembling that of a myrmelion. At Atlantic Beach several specimens were found in a tangle of raspberry vines and other plants, under cabbage palmettoes in the "hammock."

**PHASMIDÆ.*****Diapheromera femorata* (Say).***Virginia.*

Great Falls, IX, 28, 1913, (C. T. Greene), 2 ♂, 1 ♀, [Hebard Cln.].  
 Orange, VII, 21, 1913, (R. & H.), 1 ♂, 2 juv. ♀.

*North Carolina.*

Topton, VIII, 21, 1903, (A. P. Morse), 1 ♂.

*South Carolina.*

Greenville, 1887, 1 ♀, [A. N. S. P.].  
 Columbia, VII, 28, 1913, (R. & H.), 1 juv. ♂.

*Georgia.*

Clayton, VI, 1909, (W. T. Davis), 2 juv. ♂.  
 Toccoa, VIII, 4, 1913, (H.), 1 juv. ♀.

Dalton, VIII, 7, 1913, (R.), 2 juv. ♀.  
 Sharp Mountain, VIII, 6, 1913, (R.), 1 juv.  
 Jasper, VIII, 5, 1913, (R.), 4 juv. ♂, 3 juv. ♀.  
 Sand Mountain, VIII, 26, 1903, (A. P. Morse), 1 ♂, 1 juv. ♀.  
 Buckhead, VIII, 2, 1913, (R. & H.), 1 juv. ♂, 3 juv. ♀.  
 Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 3 juv. ♂, 1 juv. ♀.  
 Warm Springs, VIII, 9, 1913, (R.), 2 juv. ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 3 juv. ♂, 2 juv. ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 2 ♂, 2 juv. ♂, 3 juv. ♀.  
 Lakeland, Decatur County, 1 ♂, [Ga. St. Cln.].

Specimens from southern Georgia are very large, the largest male (Albany) is 84.5 mm. in length; however, no racial characters exist. The species has not been taken south of the fall line in the southeastern United States until extreme western Georgia and north-

western Florida is reached. The material recorded by us from the above localities was all taken in the undergrowth of pine and oak woods.

***Manomera tenuescens* (Scudder).**

1913. *Manomera orthostylus* Caudell, Proc. U. S. Nat. Mus., XLIV, p. 612, fig. 27. [Orlando, Florida.]

*North Carolina.*

Selma, VII, 7, 1903, (A. P. Morse),  
1 juv. ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
3 ♀.

Homerville, VIII, 27, 1911, (R. & H.),  
1 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 10 ♂, 5 ♀.

*Florida.*

*South Carolina.*  
Denmark, VIII, 15, 1903, (A. P. Morse), 1 ♀.

Jacksonville, VIII, 25, 1911, (R. & H.),  
1 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
1 ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R.), 1 ♀.

Series before us of adults and immature examples of both this species and *M. brachypyga*,<sup>12</sup> prove that *M. orthostylus* of Caudell, the unique type of which is before us, is an absolute synonym of the present insect, based on a male in the instar preceeding maturity. The relative proportions of the distal abdominal segments in both sexes, which readily separate adults of *tenuescens* and *brachypyga*, as readily separate immature individuals of the two species. Until the adult condition is reached, the male cerci of both species are straight, pilose and delicate in structure; those of *tenuescens* being decidedly shorter than the disto-dorsal abdominal segment and those of *brachypyga* slightly longer than that segment.

In the dog fennel, *Eupatorium compositifolium* Walt., at Cumberland Island, a climbing vine, *Bradburya virginiana* (L.) Kuntze, was frequently encountered; the elongate green pods of this vine, resting in the dog fennel, bore a remarkable resemblance to the bodies of the female walking-sticks there found.

The species is decidedly a Lower Austral and Sabalian type, previously known only from Florida. The material before us was found about a sink hole surrounded by a few gum trees in low weeds and plants and scant grasses (Winter Park), in bunch grass in a sandy scrub-oak area just above the fall line (Augusta), on dark wet ground covered with low swamp plants (Homerville), in dog fennel in long-leaf pine woods (Cumberland Island, Jacksonville) and in the low undergrowth of the long-leaf pine woods (Live Oak).

<sup>12</sup> PROC. ACAD. NAT. SCI. PHILA., 1914, p. 384, figs. 1 to 4, (1914).



**Anisomorpha buprestoides** (Stoll).*South Carolina.*

Yemassee, IX, 4, 1911, (R. & H.),  
1 ♂, 1 ♀, 2 juv. ♀.

*Georgia.*

Sandfly, IX, 3, 1911, (R. & H.), 1 ♂,  
1 ♀.

Brunswick, VIII, 30, 1911, (H.), 1  
juv. ♀.

Billy's Island, V, 1912, (J. C. Bradley),  
1 ♀; VI, 1912, (J. C. Bradley),  
1 juv. ♂, 2 juv. ♀; IX, 1-5, 1913,  
(J. C. Bradley), 3 ♂, 4 ♀; XII, 20,  
1913, (J. C. Bradley), 1 juv. ♂.

Albany, VIII, 1, 1913, (R. & H.), 2 ♂,  
3 juv. ♂, 13 juv. ♀.

*Florida.*

Jacksonville, IX, 7, XI, 3, 1913,  
(W. T. Davis), 5 ♂, 8 ♀.

Ortega, IX, 6, 1913, (W. T. Davis),  
1 ♂, 1 ♀.

Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 80 ♂, 62 ♀, 15 juv. ♀.

St. Augustine, (C. W. Johnson), 1 ♂,  
[A. N. S. P.].

Eustis, III, 1892, (H. J. Webber),  
1 ♂, 1 ♀, [Hebard Chn.].

Volusia County, 1 ♂, 1 ♀, [A. N.  
S. P.].

Warrington, VIII, 4, 1903, (A. P.  
Morse), 2 ♂, 1 ♀, 1 juv. ♀.

*Alabama.*

Mobile, (Dr. Corson, Dr. Jackson),  
1 ♂, 2 ♀, [A. N. S. P.].

The present species is peculiar to the Sabalian and Tropical Zones of the southeastern United States where it is found, at times in large numbers, in the forest undergrowth. The large series from Atlantic Beach was taken in such surroundings on the edge of a swamp; the entire series was found collected in two clusters in tall weeds, the majority of the specimens in coitu; we have a pair from this series still connected, of which the female is in the instar preceding maturity. Immature individuals were found locally numerous in tall weeds in the long-leaf pine woods along the river at Albany.

The most northern, as well as the most western, definite records for the species are given above.

**Anisomorpha ferruginea** (Beauvois).*South Carolina.*

Aiken, 1 ♂, [M. C. Z.].

*Georgia.*

Wilson Gap, Mountain City, VIII,  
22, 1913, (J. C. Bradley), 12 ♂, 1 ♀,  
9 juv. ♀.

Tallulah, VIII, 1887, 2 ♂, 1 ♀, [U. S.  
N. M. and Hebard Chn.].

Toccoa, VIII, 5, 1913, (H.), 1 juv. ♂.

Jasper, VII, 25, 1903, (A. P. Morse),  
1 ♂.

Stone Mountain, VII, 28, 1903, (A. P.  
Morse), 1 juv. ♂.

Warm Springs, 850-1,200 feet, VIII,  
9-10, 1913, (R.), 2 ♂, 2 juv. ♂, 2  
juv. ♀.

*Louisiana.*

Arcadia, Bienville Parish, X, 15, 1885,  
(L. Johnson), 1 ♀, [U. S. N. M.].

The much smaller size, different facies, different and less striking coloration and somewhat more slender and straighter limbs readily separate adults of this species from adults of *A. buprestoides*; the young of that species are, however, frequently obscurely colored and often in these stages closely resemble the present insect. The difficulty in ascertaining whether a specimen is adult increases the

perplexities of the student, and the records of *ferruginea* from Florida are either due to a misconception of the present species or are referable to the young of *A. buprestoides*.

Caudell, in his paper on the Walkingsticks of the United States,<sup>13</sup> has given, among other State records, Florida and Pennsylvania for the present insect. The first of these records applies to *A. buprestoides*, while the second is due to a mistake caused by a "Tallulah, Ga.," label appearing to be "Tallulah, Pa."

The present authors in an earlier study of *A. buprestoides*,<sup>14</sup> confused nearly mature and differently colored specimens of that species with the present insect; at that time *A. ferruginea* was not represented in their collections, its definite distribution was quite unknown and the early descriptions of the two species were and are by no means convincing.

The distribution of *A. ferruginea* apparently extends from just north of the Ohio River south over the Mississippi Valley to the Gulf States, west to extreme southeastern Nebraska and eastward through the Appalachians in Virginia and in the high portions of the Carolinas and Georgia.

The series taken at Wilson Gap was found under the bark of a single log.

#### ACRIDIDÆ.

##### *On the Races of Nomotettix cristatus (Scudder).*

A study of the series of over four hundred and fifty-eight specimens of the present species before us from the eastern United States and Canada offers convincing proof that but one known species of *Nomotettix* exists in this portion of North America. This species is divided into five geographic races which are typical over certain areas, but which intergrade so gradually that series of specimens from numerous localities between those where the typical forms are found show intermediates of every degree. The following key gives characters which are by no means decided; it attempts to define racial characters as found in typical series.

- A.—Vertex moderately projecting in front of eyes, angular excavation beneath it moderately deep in lateral aspect.  
(Vertex in lateral aspect blunt and very broadly rotundato-acute-angulate, dorsal surface of head weakly

<sup>13</sup> *Proc. U. S. Nat. Mus.*, XXVI, p. 882, (1903).

<sup>14</sup> *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 284, (1907).

fossulate on either side of median carina of vertex which is weakly elevated; eyes prominent; margins of median femora very weakly sinuate; pronotum rugoso-scabrous, cephalic margin of dorsum weakly produced over head, median carina with height above humeral angles much as in *N. c. floridanus*; antennæ shorter than in the other races.).....*Nomotettix cristatus borealis* E. M. Walker.

AA.—Vertex strongly projecting in front of eyes, angular excavation beneath it very deep in lateral aspect.

B.—Vertex in lateral aspect broadly rotundato-acute-angulate, dorsal surface of head moderately fossulate on either side of median carina of vertex which is strongly elevated; eyes moderately prominent; margins of median femora with scarcely any sinuation; pronotum minutely scabrous.

C.—Pronotum with median carina less compressed, moderately arcuate with that portion between the humeral angles often distinctly flattened, height above humeral angles 1.2 to 1.7 mm.,<sup>15</sup> cephalic margin of dorsum moderately produced over head with sides straight or weakly concave.

*Nomotettix cristatus cristatus* (Scudder).

CC.—Pronotum with median carina strongly compressed, strongly and usually evenly arcuate, height above humeral angles 1.6 to 2 mm., cephalic margin of dorsum more strongly produced over head with sides more or less strongly concave.

*Nomotettix cristatus compressus* Morse.

BB.—Vertex in lateral aspect more sharply rotundato-acute-angulate, dorsal surface of head more strongly fossulate on either side of median carina of vertex which is but moderately elevated; eyes very prominent; margins of median femora weakly sinuate; pronotum rugoso-scabrous.

C.—Other pronotal characters (see C and CC under B) nearly intermediate between those of *N. c. cristatus* and *N. c. compressus*, height of median carina above humeral angles 1.3 to 1.8 mm.

*Nomotettix cristatus arcuatus* Hancock.

CC.—Other pronotal characters (see parentheses under A) of the *N. c. borealis* type, height of median carina above humeral angles 1. to 1.4 mm.<sup>16</sup> (The rugoso-scabrous condition of the pronotum more

<sup>15</sup> The males of the present species are usually somewhat smaller than the females and, as would be expected, the majority of the sex measure nearer the minimum of the dimension here given than do the females.

<sup>16</sup> The types of this race, from Port Orange and Enterprise, Florida, do not represent the extreme development and show decided tendencies toward *N. c. arcuatus* Hancock.

decided than in *N. c. arcuatus*, much as in *N. c. borealis*.).....

*Nomotettix cristatus floridanus* Hancock.

The race of the Middle States, *N. c. compressus*, shows the greatest development of the vertex and its median carina, the median carina of the pronotum, and the production of the cephalic margin of the pronotum. The two races in distribution furthest removed from this insect, *N. c. borealis* in the north and *N. c. floridanus* in the south, show the greatest divergence from this type, which divergence has taken place along parallel lines in a number of characters (pronotal and femoral) but in others separates these two races most widely of all.

**Nomotettix cristatus borealis** E. M. Walker.

Through Dr. Walker's great kindness, we have before us the type (his figured ♀, here selected) and paratype (♀) of this insect, the only specimens known, which were taken at Diamond Lake, Temagami District, Ontario, September 7, 1903, by Dr. Walker and were described most satisfactorily by him.<sup>17</sup>

The difference given in the pronotal arcuation when compared with *N. c. cristatus* is of no value as a character, that insect exhibiting frequently such irregularity as described. The present race, however, is the most strongly defined and, as Dr. Walker suggests, the northernmost of the races of the present species.

**Nomotettix cristatus cristatus** (Scudder).

1862. *Batrachidea carinata* Scudder, Bost. Journ. Nat. Hist., VII, p. 479. [Massachusetts.]

*Ontario.*

Go Home Bay, VI, 1908, (E. M. Walker), 2 ♀, [Univ. Toronto Cln.].

*New Hampshire.*

Warren, (P. W. Whiting), 4 ♂, 35 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Clns.].

*Massachusetts.*

Tyngsboro, (P. W. Whiting), 10 ♂, 22 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Clns.].

North Saugus, VI, 16, 1906, (E. A. Back), 2 ♂, 1 ♀, [U. S. N. M.].

Wellesley, (P. W. Whiting), 7 ♂, 3 ♀, [A. N. S. P. and Hebard Clns.].

Forest Hills, V, 10 and 11, 1912 and 1913, (P. W. Whiting), 1 ♂, 1 ♀, [A. N. S. P. and Hebard Clns.].

Blue Hill, Suffolk County, (P. W. Whiting), 6 ♂, 5 ♀, [A. N. S. P. and Hebard Clns.].

Mt. Holyoke, VI, 24, 1898, (F. Knab), 1 ♂, [U. S. N. M.].

Marion, VIII, 30, 1905, (H.), 1 ♀, 1 juv. ♂.

*Connecticut.*

Lyme, VIII, 21, 1910, (B. H. Walden), 2 ♀, [Hebard Cln.].

New Haven, VI, 1, 1910, (H.), 1 ♂.

*New York.*

Forrest Park, L. I., VI, 15, 1902, 1 ♂, [Hebard Cln.].

Mosholu, VI, 22, 1902, 1 ♂, [Hebard Cln.].

<sup>17</sup> *Can. Ent.*, XLI, p. 173, pl. 7, figs. 1 and 1a, (1909).

*New Jersey.*

Lakehurst, V, 26, 1903, 1 juv. ♂,  
[Hebard Cln.].  
Whitings, IX, 28, 1906, (B. Long),  
1 ♂, [A. N. S. P.].  
Pemberton, V, 2, 1913, (H. B. Scam-  
mell), 2 ♀, [U. S. N. M.].  
Stafford's Forge, VIII, 26-31, 1907,  
(R.), 1 ♀, 1 juv. ♂, 1 juv. ♀; IX, 16,  
1905, (H.), 5 ♂, 4 ♀; IX, 31, 1908,  
(R.), 1 ♂, 1 juv. ♀.  
Parkdale, VII, 30, 1911, (R. & H.),  
1 ♂.  
Da Costa, V, 17, 1903, (E. Daecke),  
1 ♂, [Hebard Cln.].

*Pennsylvania.*

South Sterling, IX, 17, 1906, (B.  
Long), 1 ♂, [A. N. S. P.].

Laanna, Pike County, VIII, 31, 1906,  
(B. Long), 1 ♀, [A. N. S. P.]. (Long  
pronotum.)  
Tobyhanna, 2,000 feet, IX, 1-3, 1903,  
(H.), 1 ♀.  
Pocono Lake, VI, 16, 1907, (B. Long),  
2 ♀, [A. N. S. P.].  
Tyrone, IV, 3, 1 ♂, 2 ♀, [Pa. St. Dept.  
Zool. Cln.].

*Maryland.*

Jennings, 2,000 feet, middle of VIII,  
1911, (W. Stone), 1 juv. ♀, [A. N.  
S. P.].

*North Carolina.*

Mount Pisgah, 4,500 feet, X, 1, 1904,  
(H.), 1 juv. ♀.

Scudder's name *carinata* is based upon the form of the present insect having a long pronotum.

This insect, the genotype of *Nomotettix*, is typical in Massachusetts;<sup>18</sup> south of that State individuals show a tendency toward *N. c. compressus*, which in the series recorded above is strongest in the specimens from New Jersey.<sup>19</sup> The specimens from Go Home Bay, Ontario, are very similar to those from Lyme, Connecticut, neither of which series is perfectly typical.

We have found the species in the undergrowth of the pine barrens of New Jersey, but have never taken it in numbers, possibly because no examinations of this region have been made in June, during which month *N. c. compressus* reaches its greatest abundance on the barren serpentine outcrops near Philadelphia, Pennsylvania.

***Nomotettix cristatus compressus*, Morse.**

1903. *Nomotettix cristatus atavus* Blatchley, Orth. of Indiana, p. 219.  
[No locality given.]

*New Jersey.*

Clementon, V, 6, 1905, 1 ♀, [A. N.  
S. P.].  
North Woodbury, IX, 18, 1905,  
(H. L. Viereck), 1 ♀, [A. N. S. P.].

*Pennsylvania.*

Dauphin, VII, 4, 1 ♂, 2 ♀, (Pa. St.  
Dept. Zool. Cln.).  
Rockville, (Fort Hunter P. O.), X,  
16, 1 ♀, [Pa. St. Dept. Zool. Cln.].

<sup>18</sup> We have a typical series of this insect from numerous Massachusetts localities (see above); other previously recorded material before us from New Haven, Connecticut, and Atsion, New Jersey, shows tendencies toward *N. c. compressus* Morse.

<sup>19</sup> In fact, although the series recorded above from Stafford's Forge, New Jersey, certainly belongs here, as the majority of the specimens show much the closer affinity to the present insect, there are two females in the series which are intermediates individually closer to *N. c. compressus* Morse.

Enola, V, 5, 1 juv. ♂, [Pa. St. Dept. Zool. Cln.].

Brandsville, VII, 14, 1910, (H. B. Kirk), 1 ♂, [Pa. St. Dept. Zool. Cln.].

Carlisle Junction, IV, 27, 1910, (W. R. Walton), 1 ♀, [Pa. St. Dept. Zool. Cln.].

Pequea, VI, 9, 1 ♀, [Pa. St. Dept. Zool. Cln.].

Valley Forge, VI, 27, 1908, (H.), 1 ♀.

Pink Hill, Newtown Square, VI-VII, 15, 1908-11, (R. & H.), 31 ♂, 26 ♀, 4 juv. ♀.

Fern Hill, Chester County, IX, 19, 1908, (R. & H.), 1 ♂, 1 ♀.

Germantown, V, 5, 31, 1912-13, (E. R. Casey), 3 ♂, 2 ♀, [Casey Cln.].

Mount Airy, IX, 15, 1903, (H.), 1 ♀.

Collegeville, VIII, 28, 1913, (E. R. Casey), 1 juv. ♂, [Casey Cln.].

Penn Station, (Brugger), 1 ♂, [A. N. S. P.].

Beatty, V, 3, 1905, (Brugger), 1 ♀, [A. N. S. P.].

#### Ohio.

Cleveland, VII, 3, 1910, (H.), 1 ♂.

#### District of Columbia.

Washington, IX, 1883, 1 ♀, [Hebard Cln.].

#### Virginia.

Rosslyn, X, 22, 1900, (R.), 1 ♀.

Falls Church, V, 25, 1913, (A. N. Caudell), 1 ♂, [U. S. N. M.].

#### North Carolina.

Weldon, VII, 24, 1913, (R. & H.), 1 juv. ♀.

Goldsboro, VII, 25, 1913, (R. & H.), 1 ♂, 2 ♀, 1 juv. ♂, 3 juv. ♀.

Fayetteville, IX, 9, 1911, (R. & H.), 2 ♀.

#### Georgia.

Black Rock Mountain, 3,500 feet, V, 20-25, 1911, (J. C. Bradley), 1 ♀.

Clayton, 2,000 feet, V, 18-26, 1911, (J. C. Bradley), 2 ♀.

Jasper, 1,550 feet, VIII, 5, 1913, (R.), 2 juv. ♀.

Toccoa, 1,094 feet, VIII, 5, 1913, (H.), 1 juv. ♂.

In the material before us, the series from eastern Pennsylvania to Virginia shows the extreme, and what may be considered typical, development of this race. It may be noted that this race is found along the Delaware in New Jersey, while *N. c. cristatus*, though not typical, is distributed over the northern portion of the State and the pine barrens. But two specimens having the extremely long pronotum are before us; both are females, one from Beatty, Pennsylvania, the other from Virginia; this form of the present race has been named *atavus* by Blatchley.

About Philadelphia this form is very occasional excepting upon the barren serpentine outcrops, where in June adults may be found in numbers. In July and September it was found very scarce in the forest undergrowth of eastern North Carolina; at which former time half of the specimens were in the immature condition.

#### *Nomotettix cristatus arcuatus* Hancock.

1906. *Nomotettix cristatus denticulatus* Morse, Psyche, XIII, p. 119. [Caddo, Haileyville, South McAlester, Indian Territory; Denison, Texas.]

#### North Carolina.

Wilmington, IX, 8, 1911, (R. & H.), 1 juv. ♂, 2 juv. ♀.

Winter Park, IX, 7, 1911, (R. & H.), 2 ♂, 1 ♀.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 3 juv. ♀.

#### South Carolina.

Florence, IX, 6, 1911, (R. & H.), 8 juv. ♀.

Ashley Junction, VIII, 15, 1913, (R.), 1 ♂, 1 juv. ♂, 2 juv. ♀.

Yemassee, IX, 4, 1911, (R. & H.), 9 ♂, 8 ♀, 5 juv. ♀.



*Georgia.*

Augusta, VII, 29, 1913, (R. & H.),  
1 ♀ juv.  
Sandfly, IX, 3, 1911, (R. & H.), 3 ♂.  
Albany, VIII, 1, 1913, (R. & H.), 1 ♀,  
2 juv. ♀.  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 1 ♀.  
Brunswick, VIII, 30, 1911, (H.), 21 ♂,  
13 ♀, 7 juv. ♀.  
Hebardville, V, 15, 1915, (H.), 4 ♂,  
3 ♀, 2 juv. ♀.  
Suwannee Creek, VIII, 28, 1911, (R. &  
H.), 3 ♂, 1 ♀, 2 juv. ♀.  
Billy's Island, VI, 1912, (J. C. Brad-  
ley), 2 juv. ♂, 1 juv. ♀; VII, 1912,  
(J. C. Bradley), 16 ♂, 19 ♀, 2 juv.  
♀; IX, 1-5, 1913, (J. C. Bradley),  
1 ♂, 1 juv. ♀.

Homerville, VIII, 27, 1911, (R. & H.),  
25 ♂, 17 ♀, 3 juv. ♀.

*Florida.*

Jacksonville, (T. J. Priddey), 1 ♀,  
[Hebard Cln.].  
Baldwin, III, 7, 1879, (E. A. Schwarz),  
1 ♀, [U. S. N. M.].  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 2 ♂, 2 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
1 ♀.

*Mississippi.*

Biloxi, IV, 23, (F. M. Jones), 1 ♀,  
[A. N. S. P.].

A gradual diminution of the pronotal crest is noticeable in the distribution from north to south of the present race, the other characters which distinguish this race becoming in like manner more pronounced. The material from southern Georgia may be considered typical. The series of twenty-three specimens from San Pablo, Pablo Beach and Gainesville, Florida, which we have recorded as *N. cristatus*,<sup>20</sup> belong to the present race.

This race is peculiar to the Sabalian and a portion of the Lower Austral zones of the southeastern United States. It is widely distributed and sometimes abundant in the undergrowth of the long-leaf pine woods, particularly where the ground is low, sandy and water-soaked (Yemassee, Homerville, Hebardville). It has also been found abundant in low spots covered with short green grasses in the midst of saw-palmetto flats (Brunswick). Our material indicates that this race appears adult in the largest numbers later in the season than do the more northern races of the species.

We find Morse's *N. cristatus denticulatus*,<sup>21</sup> to be merely the western development of the present race showing a decided tendency toward *N. c. compressus*. The insects, however, though not typical, are decidedly nearer the present race and we have consequently placed Morse's name in the synonymy here.

***Nomotettix cristatus floridanus* Hancock.**

Twelve specimens at hand, recorded by the authors<sup>22</sup> from Lakeland, Fort Myers and La Belle, Florida, show the extreme develop-

<sup>20</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 284, (1907).

<sup>21</sup> Morse questions the racial validity of this phase in his original description.

<sup>22</sup> Jour. N. Y. Ent. Soc., XXII, p. 102, (1914).

ment of the present type, which race is founded merely on an intensification of the characters which constitute the race *N. c. arcuatus*.

This geographic race is known only from central and southern Florida, in the northern portion of its range gradually intergrading with *N. c. arcuatus*.

***Aerydium arenosum arenosum* (Burmeister).**

*North Carolina.*

Charlotte, VII, 27, 1913, (R. & H.),  
3 ♂, 2 ♀, 1 juv. ♂, 1 juv. ♀.  
Wrightsville, IX, 7, 1911, (R. & H.),  
11 ♂, 1 ♀, 3 juv.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 10 ♂, 9 ♀, 4 juv.

*Georgia.*

Vicinity of Stone Mountain, VIII, 3,  
1913, (R. & H.), 1 ♂.  
Vienna, VI, 5, 1910, 2 ♂, 2 ♀, [Ga.  
St. Cln.].

Waycross, V, 8, 1911, 1 ♀, [Ga. St.  
Cln.].  
Billy's Island, VI, 1912, (J. C. Brad-  
ley), 1 ♂.  
Mixon's Hammock, Okefenokee  
Swamp, V, 16, 1915, (H.), 10 ♂, 6 ♀.  
Spring Creek, VI, 7-23, 1911; VII,  
16-29, 1912, (J. C. Bradley), 2 ♂,  
4 ♀.

*Florida.*

Jacksonville, (T. J. Pridley), 1 ♂,  
[Hebard Cln.].

Of this series but three of the adults are of the strongly abbreviate pronotum phase, namely, a male from Lake Waccamaw, one from Mixon's Hammock and the single Jacksonville specimen. All of the other individuals have a more or less distinctly caudate pronotum. In coloration we have five principal unit types of pattern, all varying individually in tone and also in degree of combination. A large percentage of the specimens are of a uniform coloration of variable tone without markings.

From a study of the available material of this species group, it is evident that *A. arenosum*, *angustum* and *blatchleyi* are merely geographic races, limited to definite areas and probably grading into one another in equally definite areas. We have not evidence enough to demonstrate this in regard to *blatchleyi*, but that it is merely an exaggeration of the *arenosum* type is evident from an examination of a female from Deep Lake, Florida, clearly referable to *blatchleyi*. The intergradation of *arenosum* and *angustum*, however, is well established by our material, specimens from Raleigh, North Carolina, previously referred by us to *obscurum* (= *angustum*),<sup>23</sup> being intermediate in character. The principal differences between the two forms have already been set forth by Hancock, the more rugose and striate character of the dorsum of the pronotum of *a. arenosum*, however, being more evident than any of the other differential features.

From the evidence in hand we find that *A. arenosum arenosum* does

<sup>23</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 622, (1911).

not exhibit the fluctuations in pronotal structure that *A. arenosum angustum* does, there being no exact parallel to the type occurring in the latter race to which Hancock gave the name *gibbosus*. There is no valid reason for recognizing the latter condition by name, unless one is naming what are at most but formative saltations.

As a considerable portion of the references given for this form are based wholly or in part on individuals of *A. arenosum angustum*, it is at present quite difficult to mark off definitely from the literature the areas occupied by the two forms, but from the material in hand we can say that at least as far northward as Charlotte, Wrightsville and Lake Waccamaw, North Carolina, the specimens are *arenosum arenosum*, the Raleigh individuals being intermediate, as is the case with a female from Cedar Bluffs, Nebraska, while the Stone Mountain representative shows a tendency toward *A. a. angustum*, although nearer the southern form.

The material collected by us was taken on sandy shores (Lake Waccamaw), on a sandy spot at the edge of a bog (vicinity of Stone Mountain), on wet clay along a "branch" in pine woods (Charlotte) or on dry, sandy soil in open forest of short-leaf pine (Wrightsville).

***Acrydium arenosum angustum* (Hancock).**

*Maryland.*

- Laurel, V, 6, 1911, (E. B. Marshall),  
1 ♂, [U. S. N. M.].  
Plummer's Island, IX, 29, 1912, (H. L.  
Viereck), X, 13, 1912, (J. D. Hood),  
1 ♂, 1 ♀, [U. S. N. M.].  
Washington, D. C., (A. N. Caudell),  
1 ♂, [U. S. N. M.].

*Virginia.*

- Glencarlyn, IV, 27, 1913, (A. N.  
Caudell), 1 ♂, [U. S. N. M.].  
Washington, VI, 5, 1909, (A. K.  
Fisher), 1 ♂, [U. S. N. M.].  
Luray, IX, 2, 1906, (F. Knab), 1 ♀,  
[U. S. N. M.].

*North Carolina.*

- Tryon, V, 18, (W. F. Fisher), 1 ♀,  
[U. S. N. M.].

*Tennessee.*

- Clarksville, III, 31, 1909, IV, 9 and 17,  
1910 and 1911, (S. E. Crumb; on  
tobacco seed bed and hibernating  
[III, 19] in leaves), 2 ♂, 5 ♀,  
[U. S. N. M.].

*Georgia.*

- Clayton, 2,000 feet, V, 18-26, 1911,  
(J. C. Bradley), 2 ♂.  
Black Rock Mountain, 2,000-3,500  
feet, V, 20-25, 1911, (J. C. Bradley),  
1 ♂.

For comments on this form see above under *Acrydium a. arenosum*. We are using the name *angustum* in place of the synonymic but generally used *obscurum*, as *angustum* has page priority. The above north Georgia localities are the most southern from which we have examined the race. In general character the Clayton and Black Rock Mountain specimens are similar to Asheville individuals and all have the pronotum caudate. The Tryon specimen is equally typical of this race, but the Clarksville, Tennessee, individuals show some little tendency toward *arenosum arenosum*.

**Acrydium ornatum** (Say).

Chevy Chase Lake, Maryland, IV, 7, 18, 1914, (A. N. Caudell), 1 ♂, 1 ♀,  
 1904, (F. D. Conden), 1 ♀, [U. S. N. M.].  
 Cranberry, North Carolina, X, 1, 1907,  
 Washington, District of Columbia, IV, (F. Sherman), 1 ♀, [U. S. N. M.].

The Cranberry specimen has the pronotum and wings of medium length, *i.e.*, but little exceeding the apices of the caudal femora.

*On the Southeastern Species of Neotettix.*

For the past four years the problems presented by the genus *Neotettix* have been seriously considered by us, but previous to this writing we never felt sufficiently well equipped with material to make any final statements regarding the relationship of the "species" which have been described under this genus. Before us at this writing we have considerably over six hundred specimens from the eastern States, or more properly from the region east of the Alleghanies from New Jersey and Pennsylvania to Georgia and peninsular Florida. The following "species" from the eastern United States have been referred to or described in this genus:

- Tettix femoratus* Scudder, Trans. Amer. Entom. Soc., II, p. 306, (1869). [Maryland.]  
*Neotettix bolivari* Hancock, Entom. News, IX, p. 139, pl. VII, figs. 2-2d, (1898). [Opelousas, Louisiana; Tifton, Georgia.]  
*Neotettix bolivari longipennis* Hancock, Tettig. N. Amer., p. 165, (1902). [Columbus, Texas.]  
*Neotettix rotundifrons* Hancock, Entom. News, IX, p. 139, pl. VIII, figs. 3, 3a-d, (1902). [Jacksonville, Florida.]  
*Neotettix variabilis* Hancock, Tettig. N. Amer., p. 165, (1902). [Cocoanut Grove, Florida.]  
*Neotettix bolteri* Hancock, Entom. News, IX, p. 139, pl. VIII, figs. 1, 1a-e, (1898). [Jacksonville, Florida.]  
*Neotettix coarctatus* Hancock, Tettig. N. Amer., p. 165, (1902). [New Mexico (error for Dade County, Florida<sup>24</sup>); Cocoanut Grove, Florida.]  
*Neotettix hancocki* Blatchley, Orth. of Ind., p. 226, (1902). [Knox County, Indiana.]  
*Apotettix minutus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 34, pl. I, figs. 3 and 4, (1905). [Miami, Florida.]

Morse<sup>25</sup> first synonymized *rotundifrons* under *bolivari* and suggested the probability of the latter being synonymous with *femoratus*. The present authors described *minutus* in 1905, basing it on the then

<sup>24</sup> Vide Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1912, p. 245, footnote, (1912).

<sup>25</sup> Carnegie Inst. Wash., Publ. No. 18, p. 25, (1904).

unknown male of one of the forms of the present genus, but later,<sup>26</sup> after more study of the genus *Apotettix*, they placed *minutus* in the synonymy under *coarctatus*, considering it to be the caudate type of the male. In 1911, the present authors expressed their belief that Morse was correct in his disposition of *rotundifrons* and also endorsed the probability of *bolivari* and *femoratus* being the same,<sup>27</sup> the type of the latter, which was unknown to Hancock, being before them. In 1912, Rehn and Hebard,<sup>28</sup> after examining the types of *coarctatus* and *variabilis* in the United States National Museum, stated that *coarctatus* was "very close to *N. bolteri* Hancock, being probably a southern geographic race of the same," while of *variabilis* they remarked that it is "very close to *N. femoratus* (Sc.)," and that "more material may show this to be a geographic race of *N. femoratus*."

A very careful analysis has been made of the descriptions of the "species" listed above and the following comments are also based on exhaustive examinations of the large series before us, which, representing as it does fifty-five localities, we feel is sufficient for conclusive deductions. The possession of the type of *femoratus* (a female from Maryland) enables us to speak with positiveness regarding that species, which is the crux of the whole question, as Hancock, who is chiefly responsible for the specific names listed above, was entirely unacquainted with its identity. The synonymy of *bolivari* and *rotundifrons* can be clearly demonstrated by the examination of almost any extensive series from a single locality, the supposedly differential characters being purely individual. A comparison of Georgia and north Florida material, which is topotypic and in character perfectly typical of "*bolivari*" and "*rotundifrons*," with the type of *femoratus* shows they are certainly inseparable specifically or even varietally, while the desirability or even advisability of naming the long pronotum form of "*bolivari*" (*b. longipennis* Hancock) is not at all evident to us, unless we intend in similar fashion to multiply names by describing all of the color phases of polychromatic species.

Hancock's *bolteri* we find is a distinct species, typically very different from *femoratus*, but peculiarly losing some of its definition in central and southern Florida, individuals from which region are often hard to separate from *femoratus*. Numerous comparisons have

<sup>26</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, p. 244, (1912).

<sup>27</sup> *Ibid.*, 1910, p. 622, (1911).

<sup>28</sup> *Ibid.*, 1912, p. 244, (1912).



shown us that *coarctatus* is merely this southern *bolteri* somewhat modified from the typical more northern material, but so slightly that there now appears no valid reason for retaining the name, even in a racial sense. Curiously enough, however, it is in south and central Florida only that long-pronotum individuals of the *bolteri* type have been taken. Hancock's *variabilis* we find is merely a very faintly emphasized type of *femoratus*, certainly too poorly defined to be entitled to a name. In the *femoratus* type in south and central Florida we find the nearest approach seen in that species to the *bolteri* series, the two lines seeming to vary toward one another in that area in a fashion not found in our series from northern Florida northward. This fluctuation apparently expresses a certain amount of instability of the forms in that region, a probable breaking up along other lines being under way, but as far as taxonomy is concerned it is undesirable, and in fact impossible, to attempt to express or define the minute shades of difference seen, although they can be appreciated in certain specimens. From the sum total of specimens examined it is evident that some few specimens of "*coarctatus*" and "*variabilis*" stand out from *bolteri* and *femoratus*, respectively, with some degree of distinction, but the vast majority, into which the distinctive specimens blend, cannot be separated unless one sorts by localities. In consequence of the fluctuations of these Florida specimens, the construction of a key separating *femoratus* and *bolteri* has not been easy. A character which we suggested as diagnostic in 1912,<sup>29</sup> *i.e.*, subscutellate or regularly diverging frontal forks, we now find to be unstable in both forms, although diagnostic in the greater proportion of the specimens. In consequence the present key for separating *femoratus* and *bolteri* is almost entirely comparative, but we feel it will serve the purpose of separating two species which over by far the greater portion of their ranges are clearly defined.

Of Blatchley's *hancocki* we now have, through the kindness of the author, a topotype (♀; Knox County, Indiana, VII, 1, 1913, W. S. Blatchley) before us. This specimen shows that the species is inseparable from *N. bolteri*, the individual in hand being indistinguishable from east coast material, of which, it will be seen, we have a sufficient quantity to realize the extent of intra-specific variation.

Quite apart from the relationship of the previously known forms of this genus from the southeastern States, we find in the present series five specimens referable to this genus which are quite note-

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<sup>29</sup> PROC. ACAD. NAT. SCI. PHILA., p. 244, (1912).



worthy in a number of ways. The first is, that, although the median carina of the pronotum is as highly cristate as in the average of the genus *Nomotettix*, they lack the characters of the fastigium and of the frontal costa found in that genus. The second is, that the frontal costa is more widely scutellate between the antennal bases than in the other forms of *Neotettix*, the width of the same being about one-half that of the very broad fastigium. The third and most striking is, that while the specimens in general size and character of integument are fully adult, they lack the usual bisinuate form of the caudal margin of the lateral lobes of the pronotum of the adult. That the material is adult is proven, however, by the presence of distinctly developed tegmina and wings in the female sex and wings only in the male sex, entirely or partially hidden under the pronotum. This very remarkable condition, *i.e.*, the retention of an immature pronotal type into the adult condition, has, however, been found to exist in species of the genus *Acrydium*, for a discussion of which see the comments of the senior author on the African *A. dasynotum* and *virunganum*.<sup>30</sup> A similar condition in *Acrydium kraussi*, from Sweden, has recently been described by Haij as variety *paradoxa*. That this condition is deep seated in the subfamily is quite apparent, and it is equally evident that it is characteristic of certain species and again occurs as a variant in species normally of the usual type.

*Key to the Southeastern Species of Neotettix.*

- A.—Lateral lobes of the pronotum with caudal margin unisinate. Tegmina absent (♂) or present but almost entirely hidden under the pronotum (♀). Pronotal median carina strongly arcuate and sublamellate (much as in *Nomotettix*).....*proavus* n. sp.
- AA.—Lateral lobes of the pronotum with usual bisinuate caudal margin. Tegmina always present and entirely exposed. Pronotal median carina not strongly arcuate or sublamellate.
- B.—Form more slender. Dorsum of pronotum thickly and finely granuloso-tuberculate and (occasionally) weakly rugose, without distinct strumose rugæ. Median carina of pronotum fine, more distinct from the dorsal surface of the pronotum. Caudal femora with ridges of dorso-lateral face and external pagina less strumose.....*femoratus* (Scudder).
- BB.—Form more robust. Dorsum of pronotum with elevato-strumose ridges and "bosses," particularly between

<sup>30</sup> Wissensch. Ergeb. Deutsch. Zent.-Afr.-Exp., 1907-1908, V, p. 66, (1914).

the humeral angles, more pronounced in the female, the protuberances usually paired and regular, but occasionally varying in intensity. Median carina of pronotum coarser, less distinct from the dorsal surface of the pronotum. Caudal femora with ridges of dorso-lateral face and external pagina more strumose..... *bolteri* Hancock.

*Neotettix proavus* new species. Pl. XII, figs. 1, 2.

The differential characters of this very striking species have been summarized under the generic discussion and in the key for the species.

TYPE: ♀; Macon, Bibb County, Georgia. July 30–31, 1913. (Rehn and Hebard.) [Hebard Collection, Type No. 11.]

*Description of Type.*—Size rather large (for the genus); form compressed; surface ruguloso-tuberculate. Head with the greatest transverse width through the cheeks; median carina of the occiput and fastigium distinct but not high, regularly arcuate into the line of the face when seen from the side, transverse carinae of the fastigium moderately arcuate, the fastigium about twice as wide as one of the eyes, moderately produced cephalad of the same, surface of the fastigium distinctly fossulate on each side near the eye; outline of the face when seen from the side regularly arcuate into the fastigial outline dorsad, very faintly and broadly arcuate between the paired and median ocelli; frontal costa with the forks strongly diverging ventrad to the antennal bases, thence subparallel to the median ocellus, the interspace very broad, nearly one-half that of the fastigium, scutellate, sulcate, very strongly so dorsad (fig. 2); eyes moderately prominent, very faintly flattened; antennæ short, not equal to the depth of the head, twelve jointed. Pronotum strongly compressed, in section acute tectate with a sublamellate crest, in profile the crest is well arcuate to the humeral region, thence moderately and regularly subarcuate declivent to the caudal extremity of the pronotum, height of crest above humeral angle very slightly greater than the depth from that point to the ventral angle of the lateral lobes; cephalic margin of the pronotal disk obtuse-angulate with the arms of the angle concave, this angle reaching cephalad over the head only to the middle of the eyes; cephalic carinae very slightly converging cephalad, humeral angles very obtuse, dorso-lateral carinae distinct, arcuate dorsad, regularly converging to the blunt, weakly emarginate caudal apex of the pronotum; surface of the dorsum of the pronotum with indications of longitudinal elevated ridges between the shoulders; lateral lobes of the pronotum having only the ventral sinus

indicated on the caudal margin, the tegminal sinus represented by only a faint notch (fig. 1). Tegmina reduced in size, vestigial, about as long as the eye, normally hidden under the pronotum. Wings abbreviate, reaching only to the caudal third of the pronotum. Ovipositor jaws strongly compressed, decidedly dentate. Cephalic femora with the dorsal margin entire, ventral margin weakly undulate. Median femora with dorsal margin very faintly, and ventral margin weakly, undulate. Caudal femora moderately robust, in length very slightly more than two-thirds that of the pronotum, greatest width of the femora contained slightly more than twice in the length, no distinct genicular tooth indicated on dorsal margin, pattern of the pagina of the dorso-lateral face well defined and moderately elevated; caudal metatarsi distinctly exceeding the remaining tarsal joints in length, distal metatarsal pulvillus equal to the two proximal ones in length.

*Allotype*: ♂; Same data as type. [Hebard Collection.]

*Description of Allotype*.—Differing from the type in the following features. Size somewhat less than in the female sex; form similar; surface identical in character. Head with the fastigium very faintly narrower than in the female, but otherwise similar. Pronotum as in the female. Tegmina absent. Wings proportionately less developed than in the female. Limbs as in the female.

The coloration varies from a type of uniform fuscous black with weakly indicated velvety black posthumeral triangles on the dorsal surface of the pronotum (allotype), to an opposite extreme with verona brown on the caudal half of the pronotum, greater portion of lateral lobes of the pronotum and greater portion of dorsal and lateral faces of the caudal femora, with a heavy saddle of fuscous black covering the remainder of the pronotum, abdomen, limbs, ventral surface and head (type). The Jasper male is similar to the allotype but more fuscous and with the black triangles very faint, while the Buckhead female approaches bone brown with distinct triangles and a generally more mottled coloration. The sixth specimen examined, mentioned more fully below, is almost uniform natal brown. The limbs are more or less variegated in the contrastingly colored specimens, the caudal femora particularly so, the ventral face of the latter, however, more solidly blackish than any other aspect of the limbs. The antennal joints are narrowly annulate with verona brown on fuscous black, the distal extremity largely of the former color. The eyes vary from cameo brown to vandyke brown, mottled.

*Measurements (in millimeters).*

	Length of body.	Length of pronotum.	Depth of pronotal crest to humeral angle.	Length of caudal femur.
♀ Macon, Georgia. TYPE.....	10.4	8.5	1.8	6.
♀ Buckhead, Georgia.....	9.9	8.6	1.9	6.
♂ Macon, Georgia. Allotype..	8.1	7.3	1.5	5.
♂ Jasper, Georgia.....	8.2	7.5	1.6	5.
♂ Murphy, North Carolina.....	8.5	7.8	2.	5.3
♂ Unknown locality.....	8.2	7.4	1.4	5.3

In addition to the type and allotype we have before us the specimens measured above. The data for the Buckhead specimen is August 2, 1913, (H.); for the Jasper individual, elevation 1,550 feet, August 5, 1913, (R.); for the Murphy specimen, July 25, 1903, (A. P. Morse). These three specimens can be considered paratypes. The specimen without locality belongs to the Hebard Collection ex Bruner and bears a label "Schaum's Collection."

The males show no trace of tegmina, but the wings are developed in all, though varying somewhat in length. In the two females, however, the tegmina are evident, although mere pads.

The specimens taken by us were all on the ground in woodland, composed of short-leaf pine (Macon), mixed pine and oak (Jasper) or oak alone (Buckhead). At Macon the species occurred among pine needles and at Buckhead it was on quite sandy soil.

***Neotettix femoratus* (Scudder).***Neotettix bolivari* Hancock.*Neotettix bolivari longipennis* Hancock.*Neotettix rotundifrons* Hancock.*Neotettix variabilis* Hancock.*Pennsylvania.*

Willow Grove, Montgomery County,  
V, 18, 1912, (E. R. Casey), 1 juv. ♀.  
[Casey Cln.]

Pink Hill, Delaware County, VI, 19,  
1908, (R. & H.), 1 ♀.

*New Jersey.*

Atsion, X, 8, 1903, (H.), 1 juv. ♀.

*Delaware.*

Millsboro, (B. Long), 1 ♂. [A. N.  
S. P.]

*Maryland.*

No further data. 1 ♀, TYPE, [A. N.  
S. P.]

Plummer's Island, VI, 20, 1909, (W. L.  
McAtee), 1 ♀, [U. S. N. M.].

River View, VI, 29, 1898, (F. C. Pratt),  
1 ♀, [U. S. N. M.].

*Virginia.*

Orange, VII, 21, 1913, (R. & H.),  
1 ♂, 1 ♀.

Fredericksburg, VII, 20, 1913, (R. &  
H.), 5 ♂, 4 ♀.

*North Carolina.*

Hendersonville, VI, 1907, (F. Sher-  
man), 1 ♀, [U. S. N. M.].

Greensboro, VII, 26, 1913, (R. & H.),  
9 ♂, 14 ♀, 1 juv. ♀.

Weldon, VII, 24, 1913, (R. & H.).  
1 ♂, 1 ♀.

Goldsboro, VII, 25, 1913, (R. & H.).  
9 ♂, 3 ♀.

Winter Park, IX, 7, 1911, (R. & H.),  
4 ♂, 1 ♀.

Charlotte, VII, 27, 1913, (R. & H.),  
1 ♀.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.),  
1 ♀.

Manning, V, 23, 1914, (Witmer Stone),  
1 ♂, [A. N. S. P.].

Ashley Junction, VIII, 15, 1913, (R.),  
1 ♀.

Yemassee, IX, 4, 1911, (R. & H.),  
8 ♂, 8 ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis),  
10 ♂, 10 ♀.

Rabun Bald, 4,000-4,800 feet, VIII,  
21, 1913, (J. C. Bradley), 1 ♀.

Black Rock Mountain, 3,500 feet, V,  
20-25, 1911, (J. C. Bradley), 1  
juv. ♀.

Pinnacle Peak, VIII, 20, 1913, (J. C. Bradley),  
1 ♂.

Toccoa, VIII, 4-5, 1913, (H.), 1 ♀.

Thompson's Mills, X, 1909, (H. A. Allard),  
2 ♂, [U. S. N. M.].

Buckhead, VIII, 2, 1913, (R. & H.),  
5 ♂, 4 ♀.

Vicinity of Stone Mountain, VIII, 3,  
1913, (R. & H.), 2 ♂.

Macon, VII, 30-31, 1913, (R. & H.),  
9 ♂, 1 ♀.

Augusta, VII, 29, 1913, (R. & H.),  
6 ♂, 3 ♀, 1 juv. ♂, 2 juv. ♀.

Isle of Hope, IX, 3, 1911, (R. & H.),  
1 ♀.

Brunswick, VIII, 30, 1911, (R. & H.),  
14 ♂, 7 ♀.

Honey Island, VI, 1, 1912, (J. C. Bradley),  
2 ♀.

Billy's Island, VI-VII, 1912, (J. C. Bradley),  
11 ♂, 4 ♀.

Suwannee Creek, VIII, 28, 1911,  
(R. & H.), 1 ♂.

Hebardville, V, 15, 1915, (H.), 17 ♂,  
4 ♀, 2 juv. ♀.

Homerville, VIII, 27, 1911, (R. & H.),  
6 ♂, 11 ♀.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂,  
4 ♀, 1 juv. ♂.

Spring Creek, VI, 7-23, 1911, VII,  
16-29, 1912, VIII, 26-28, 1913,  
(J. C. Bradley), 5 ♂, 8 ♀, 1 juv. ♀.

*Florida.*

Jacksonville, IV, 1885, (Ashmead);  
VIII, 25, 1911, (R. & H.), 3 ♂, 3 ♀.

St. Augustine, XI, 8, 1911, (G. P. Engelhardt),  
1 ♂.

Live Oak, VIII, 26, 1911, (R. & H.),  
6 ♂, 3 ♀, 3 juv. ♀.

The comments made in the prefatory remarks on this genus explain the synonymy given above. An analysis of the present material for the ratio of individuals with abbreviate and those with caudate pronota shows the larger series, as a rule, contain a greater percentage of the caudate type and that geographically the difference has no significance. Morse<sup>31</sup> has noted that in a series of one hundred and fifty-two specimens from Waycross, Georgia, the two phases were present in "equal numbers; but the usual proportion of long-winged examples is much lower, ranging from 5 to 20 per cent." The largest series examined by us from the region under consideration show the following: Sulphur Springs, N. C., 27 specimens, 7 caudate; Thomasville, Ga., 24 specimens, 6 caudate; Hebardville, Ga., 21 specimens, 2 caudate; Brunswick, Ga., 21 specimens, 2 caudate; Rabun County, Ga., 20 specimens, 2 caudate; Greensboro, N. C., 19 specimens, 1 caudate; Homerville, Ga., 17 specimens, 2 caudate; Yemassee, S. C., 16 specimens, 1 caudate; Billy's Island, Ga., 15 specimens, 2 caudate. From these series it will be seen that Morse's general figures hold true. Rather curiously, the nine specimens

<sup>31</sup> Carnegie Inst. Wash., Publ. No. 18, p. 25, (1904).



from Live Oak, Florida, have six of their number with the pronotum caudate. It is quite probable that immediate environment is the governing factor in the production of the two types, and we have here an interesting field for experimental work.

In size such variation as is found is, apparently, in the main individual or environmental, while the rugosity of the dorsum of the pronotum is another variable feature in all probability dependent on environment. The fluctuations in the latter respect are considerable, but in no case are they sufficient to cause confusion with *N. bolteri*.

The variation in the form of the frontal costa is quite appreciable, and of one hundred and ninety-six specimens examined for this character, one hundred and fifty-six have the interantennal section scutellate or "flask-shaped," nine show a slightly different type, twenty-three are more strongly divergent and three have the lateral margins of the costa regularly divergent ventrad as in the majority of *N. bolteri*. These three aberrant individuals are from widely separated localities—Fredericksburg, Virginia; Homerville, Georgia, and Live Oak, Florida—and in no other respect do they approach *bolteri*.

In coloration we find this species to be more uniform than most of our common nearctic grouse-locusts, by far the greater portion of the material being brownish, with or without triangular blackish posthumeral areas. The variation consists of a more or less complete "pepper and salt" effect, rarely a pale "saddle," a pale outline of the median carina of the pronotum and very infrequently paired pale areas on the dorsal surface of the caudal femora. In addition to these rather infrequent differences, numerous specimens are strongly infusate, occasionally almost black, while quite rarely they are almost uniform cinereous. The general tone is undoubtedly a response to the environment, those from sandy or clayey soils, as at Homerville, Live Oak, Greensboro and Fredericksburg, showing the paler shades, but this is not absolute, as individuals from Jacksonville taken on bare white sandy soil are very dark. Apparently the degree of moisture in the soil produces no response in color, as the material from Augusta, which was taken in open, moderately dry pine woods, averages darker than that from Homerville which was taken on damp sandy ground.

From the mapped distribution of this species it will be seen that the northern boundary of its range is in the Upper Austral zone, probably being the upper boundary of that area, southward the



form extending over the Lower Austral, Sabalian and Subtropical zones and in the southern Alleghanies working up into the Transition, where it occurs as high as 5,500 feet on Roan Mountain, North Carolina, and 4,000-4,800 feet on Rabun Bald, Rabun County, Georgia. In detail its known distribution extends from Staten Island, New York, Jamesburg, New Jersey, and Willow Grove and Pink Hill, Pennsylvania, south to southern Florida (Miami and Coconut Grove), west to central Iowa (Ames), east-central Oklahoma (South McAlester) and east-central Texas (Columbus). Ames, Iowa, and Bloomington, Indiana, are the most northern known localities in the Mississippi Valley region.

The species is generally distributed in a variety of environments, these varying from distinctly saturated soil to sandy loams and bare white sand areas, from bare humus and sand to areas of short green grasses, dry wire grass to low bushes and foot-high grasses. It also occurs in open meadowy areas, palmetto flats and again under long-leaf and short-leaf pines and gums.

***Neotettix bolteri* Hancock.**

*Neotettix hancocki* Blatchley.

*Neotettix coarctatus* Hancock.

*Apotettix minutus* Rehn & Hebard.

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.),  
12 ♂, 9 ♀.

*North Carolina.*

Goldsboro, VII, 25, 1913, (R. & H.),  
6 ♂, 4 ♀.

Fayetteville, IX, 9, 1911, (R. & H.),  
1 ♀.

Wrightsville, IX, 7, 1911, (R. & H.),  
2 ♂.

*South Carolina.*

Manning, V, 23, 1914, (Witmer Stone),  
1 ♂, 1 ♀, [A. N. S. P.].

Sullivan Island, IX, 5, 1911, (R. & H.),  
10 ♂, 10 ♀, 1 juv. ♂, 1 juv. ♀.

Yemassee, IX, 4, 1911, (R. & H.), 1 ♂.

*Georgia.*

Tybee Island, IX, 2, 1911, (R. & H.),  
1 ♀.

St. Simon's Island, IV, 22-V. 12, 1911,  
(J. C. Bradley), 1 juv. ♀.

Hebardville, V, 15, 1915, (H.), 1 ♂.

Spring Creek, VII, 16-29, 1912, (J. C.  
Bradley), 1 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
1 ♀.

Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 3 ♀.

Fort Reed, IV, 20, 1876,<sup>32</sup> 1 ♀, [Hebard  
Cln.].

The remarks made under the generic treatment will explain the above synonymy. We find that none of the specimens of the species taken from northern Florida northward are of the form with the caudate pronotum, but that the series from south and central Florida (Hancock's *coarctatus*) show about 20 per cent. of the caudate type.

<sup>32</sup> This specimen is labelled "*Batrach. cristata* Harris" on one of Scudder's labels in his handwriting. Probably all of the material reported by Scudder from that locality under that name (*Proc. Bost. Soc. Nat. Hist.*, XIX, p. 90, (1877).) should be referred to *bolteri*.

In the latter lot the proportionate difference in this respect between the sexes is slight. Here, as in *femoratus*, it is possible that immediate environment is the responsible factor for the development of the caudate type or the alternative abbreviate one.

In south and central Florida this species varies away from the more northern type in the slightly more compressed form, the breaking up of the usually linear, strumose pronotal ridges into less elongate scabrosities, while in the abbreviate individuals the caudal process of the pronotum is more acute. The importance, even relatively, of these differences is discounted when we examine the entire series before us and find that specimens from Sullivan Island, South Carolina, and Wrightsville, North Carolina, are as compressed as the south Florida individuals, while representatives from other Carolina localities are no more strongly strumose, and just as angulate caudad on the pronotum, as in the south and central Florida material. The width of the fastigium and the tegminal length and width vary so individually in a series from any locality, that no diagnostic weight can be placed upon any of these features. In the strongly accentuated condition this species occurs in northern Florida and southern Georgia, north and south of which a certain portion of the material is less strikingly marked, although a large part or the larger part is decidedly typical of the species, but in all of the specimens examined the recognition of the material is not difficult, except in the case of south and central Florida individuals. With these, however, we feel that the characters given in the key will enable the student to separate *bolteri* from *femoratus*. Doubtless environment is responsible for most of the differences mentioned above, as it probably is to a degree for size difference, but in this there is much of an individual character, as material from the same environment at the same locality shows.

The variation in the form of the frontal costa found in *femoratus* is paralleled in the present species, the regularly diverging type being the normal form, the scutellate type the exception. The coloration varies as in *femoratus*, but as a rule to a lesser degree.

The range of this species in the southeastern States is now known to extend from Petersburg, Virginia, south to Key West, Florida, west to Pensacola Bay (Warrington and Fort Barrancas), Florida, and inland as far as Spring Creek, Georgia, and Fayetteville, North Carolina. It is thus seen to be limited to the Lower Austral, Sabalian and Subtropical zones, probably ranging to eastern Texas and certainly up the Mississippi Valley as far as southwestern Indiana. Previous to this writing *bolteri* was only known from Florida.

This species occurs in as great a variety of habitats as *femoratus*, having been taken in marshy sink holes, among grasses in marshy spots near streams and lakes (Petersburg and Fayetteville), in wet weedy spots and among low undergrowth in short-leaf pine woods (Goldsboro and Yemassee), in heavy palmetto and live-oak jungle (Atlantic Beach), among undergrowth on dunes and in bare spots on barrier beaches (Tybee and Sullivan Islands and Wrightsville).

**Paratettix rugosus** (Scudder).

St. Simon's Island, Georgia, IV, 22-V, Jacksonville, Florida, (T. J. Priddey),  
12, 1911, (J. C. Bradley), 1 ♀. 3 ♂, 4 ♀, [Hebard Cln.].

We have also examined a pair from Fort Reed, Florida, determined as this species by Scudder. All of the specimens of the present series have the pronotum caudate.

Tybee Island and St. Simon's Island are the most northern points in the eastern States from which the species is known.

**Paratettix cucullatus** (Burmeister).

*Virginia.*

Orange, VII, 21, 1913, (R. & H.), 2 ♂.  
Fredericksburg, VII, 20, 1913, (R. & H.), 8 ♂, 9 ♀, 8 juv.

*North Carolina.*

Tryon, V, 21 to 31, (W. F. Fiske),  
2 ♂, 2 ♀, [U. S. N. M.].  
Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂, 1 ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 2 ♂, 3 ♀.

Tallulah Falls, VII, 1910, (W. T. Davis), 1 ♀.

Toccoa, VIII, 22, 1909, 1 ♂, [Ga. State Cln.].

Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 1 ♀.

Albany, VIII, 1, 1913, (R. & H.), 4 ♂, 3 ♀.

Spring Creek, VI, 7-23, 1911; VII, 16-29, 1912; VIII, 26-28, 1913, (J. C. Bradley), 22 ♂, 22 ♀, 1 juv.

Bainbridge, IX, 3-7, 1910; IX, 17-X, 19, 1910, (J. C. Bradley), 2 ♂, 5 ♀, 1 juv.

From this material it is evident that *cucullatus* varies individually quite a little in general size in both sexes, and also to an appreciable degree in the rugosity of the dorsum of the pronotum. The general color varies considerably in tone, through brownish blacks and browns to dull ochre shades, with mottled individuals rather infrequent and "collared" specimens quite rare. The posthumeral paired triangular velvety black areas are not strongly indicated in the greater proportion of the specimens and absent in a considerable number.

The Thomasville specimens previously recorded by us as *texanus*<sup>33</sup> we find on re-examination and comparison to be *cucullatus*.

At Fredericksburg the species was found to be rather scarce along the sandy edge of a stream near the Rappahannock River. At

<sup>33</sup> PROC. ACAD. NAT. SCI. PHILA., 1904, p. 782, (1905).

Lake Waccamaw it occurred on the sandy shore of the lake and at Albany on eroded limestones and sand bars along the Flint River, at the former locality associated with *Acrydium a. arenosum*.

***Paxilla obesa* (Scudder).**

*North Carolina.*

Wilmington, IX, 8, 1911, (R. & H.),  
1 juv. ♀.

*South Carolina.*

Yemassee, IX, 4, 1911, (R. & H.),  
20 ♂, 17 ♀, 4 juv. ♂, 8 juv. ♀.

*Georgia.*

Hebardville, V, 15, 1915, (H.), 2 ♂;  
VIII, 28, 1911, (H.), 2 ♀, 2 juv. ♀.  
Billy's Island, VIII, 31, 1913, (J. C.  
Bradley), 1 juv. ♀.

Fargo, VIII, 31, 1913, 1 juv. ♀, [Ga.  
St. Cln.].

Homerville, VIII, 27, 1911, (R. & H.),  
6 ♂, 10 ♀, 6 juv. ♂, 13 juv. ♀.

*Florida.*

Jacksonville, IV, 1885, (W. H. Ash-  
mead), 2 ♀, (T. J. Priddey), 2 ♂,  
[all Hebard Cln.].

Hastings, (A. J. Brown), 33 ♂, 38 ♀  
6 juv. ♀, [Morse Cln.].

It is interesting to note that at the two localities where large series of the present insect were found by us, the only two large series of *Tettigidea prorsa* were taken. The present species appears to be entirely confined in distribution to the Sabalian and Tropical zones where it is further restricted to low, blackish, water-soaked ground covered with low bog plants (sun-dews, pitcher plants, etc.), in pine woods (long-leaf pine at all of the localities except Yemassee, where the forest was composed of the short-leaf species which is sometimes found in this region near swamps), so that even in its limited range its distribution is markedly discontinuous. This species has been recorded northward as far as New Berne, North Carolina, and southward to Detroit, Florida, while De Funiak Springs, Florida, is the most westerly published record.

All but two of the series taken at Homerville were captured in an area a few yards in diameter, where the peculiar vegetation described above flourished, wide search through the swampy undergrowth of the pine woods elsewhere revealed only two young.

***Tettigidea prorsa* Scudder.**

1895. *Tettigidea prorsa elongata* Morse, Jour. N. Y. Ent. Soc., III, p. 16.  
[Georgia.]

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.),  
1 ♀.

Wilmington, IX, 8, 1911, (R. & H.),  
2 juv. ♂.

*South Carolina.*

Yemassee, IX, 4, 1911, (R. & H.),  
27 ♂, 9 ♀, 23 juv. ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 1 ♀.  
Hebardville, V, 15, 1915, (H.), 1 ♂.

Suwannee Creek, VIII, 28, 1911, (R. &  
H.), 1 ♂.

Homerville, VIII, 27, 1911, (R. & H.),  
6 ♂, 7 ♀, 3 juv. ♀.

This aberrant species appears to be a primitive form, as immature

examples of *T. lateralis* showing a somewhat closer structural similarity to this species than do adults of that insect. Morse's name *elongata* was proposed for the individuals of this species having a caudate pronotum; three males and one female from Yemassee, South Carolina, are of this phase.

The majority of the adults have the dorsal surface of the pronotum somewhat lighter brown in coloration than the lateral lobes of the same, only seven individuals are unicolorous and darker, while but one female (Homerville) has the dorsal surface of the pronotum unusually pale and tawny-olive in tone.

The present insect has been found from Beach Haven, New Jersey, to extreme southern Georgia. Its distribution is discontinuous, though not to the degree of that of *Paxilla obesa*, for while it has been found to prefer areas in the pine woods of low, blackish, water-soaked ground covered with low bog plants (Wilmington, Yemassee, Homerville), it has also been taken in various low grasses near "hammock" land (Augusta, Hebardville, Suwannee Creek, Homerville) and in swamp grasses along a wooded stream (Fayetteville). The specimen from Augusta was taken just below the fall line among long-leaf pines.

***Tettigidea spicata* Morse.**

*Florida.*

Florida, (Morrison), 6 ♀, TYPE, *paratype* and series taken with these, [Hebard Cln.].  
Jacksonville, (T. J. Priddey), 2 ♀, [Hebard Cln.].  
Pablo Beach, IV, S, (P. Laurent), 1 ♀, [Hebard Cln.].

*Alabama.*

Alabama, (Morrison), 2 ♂, 4 ♀, [Hebard Cln.].

*Louisiana.*

New Orleans, (Coleman), 2 ♀, [Hebard Cln.].

Morse in his original description gives "intermediate in structure of vertex between *apiculata* and *armata*, but more nearly allied to the latter." This is true in respect to the vertex, but in the total of characters the relationship to *apiculata* is much more decided, the present insect being apparently a less strongly developed form of a common stock. The more arcuate character of the dorsum of the pronotum in transverse section between the humeral angles is one of the most apparent characters to distinguish this species from *T. armata*, from which insect it further differs in the characters given by Morse.<sup>34</sup>

Specimens referred to this species by the authors from the vicinity

<sup>34</sup> *Jour. N. Y. Ent. Soc.*, III, p. 108, (1895).

of Thomasville, Georgia, are in the present paper correctly placed under *T. armata*.

A peculiar color type, in which the pronotum has a pale medio-longitudinal marking which is narrowest between the shoulders, is found in the Pablo Beach specimen. This type of coloration is not found in the races of *T. lateralis*.

In the Sabalian zone the present insect is one of the scarcer species. For the southeastern United States, "Georgia" was the most western locality hitherto known.

*Tettigidea lateralis lateralis* (Say).

1838. *T[etrix] polymorpha* Burmeister, Handb. Entom., II, Abth. 2, Pt. 1, pp. 659-660. [South Carolina.]

1902. *Tettigidea medialis* Hancock, Tettig. N. Amer., p. 152. [Southern Illinois; Missouri; Tennessee; Louisiana.]

*New Jersey.*<sup>35</sup>

Ortley, IV, 16, 1903, (H. L. Viereck),  
1 ♂, [A. N. S. P.].  
Stafford's Forge, IX, 16, 1905, (H.),  
2 ♂, 4 ♀.  
Atsion, X, 8, 1903, (H.), 2 ♀.  
Ocean City, IV, 19, 1903, (H. L.  
Viereck), 3 ♀, [A. N. S. P.].  
Cape May, VII, 4, 1908, (H. L.  
Viereck), 1 ♂, [A. N. S. P.].

*Delaware.*

Rehoboth, VI, 8, 1908, (B. Long),  
1 ♂, [A. N. S. P.].

*Maryland.*

Chestertown, VIII, 18, 24, 27, 1899,  
(E. G. Vanatta), 1 ♂, 2 ♀, 1 juv. ♀,  
[A. N. S. P.].  
Hyattsville, VIII, 14, (A. N. Caudell),  
1 juv. ♀, [U. S. N. M.].  
Washington, D. C., IV, IX, 1883-84,  
13 ♂, 14 ♀, [Hebard Cln.].

*Virginia.*

Franklin City, VI, 24, 1907, (B. Long),  
5 ♂, [A. N. S. P.].  
Fredericksburg, VII, 20, 1913, (R. &  
H.), 5 ♂, 4 ♀, 2 juv. ♂, 3 juv. ♀.  
Orange, VII, 21, 1913, (R. & H.), 1 ♂,  
2 ♀, 3 juv. ♀.  
Petersburg, VII, 23, 1913, (R. & H.),  
6 ♂, 6 ♀, 1 juv. ♀.  
Lynchburg, VII, 22, 1913, (R. & H.),  
1 juv. ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.),  
1 ♂, 1 ♀.

Goldsboro, VII, 25, 1913, (R. & H.),  
7 ♂, 3 ♀, 4 juv. ♀.  
Greensboro, VII, 26, 1913, (R. & H.),  
3 ♂, 2 ♀.  
Fayetteville, X, 9, 1911, (R. & H.),  
2 ♂, 1 ♀, 3 juv. ♀.  
Charlotte, VII, 27, 1913, (R. & H.),  
3 ♀.  
Wilmington, IX, 8, 1911, (R. & H.),  
2 ♂, 1 ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
1 ♂.  
Wrightsville, IX, 7, 1911, (R. & H.),  
3 ♂.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 34 ♂, 20 ♀, 8 juv. ♂, 8 juv. ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 ♂.  
Florence, IX, 6, 1911, (R. & H.), 1 ♀.  
Columbia, VII, 28, 1913, (R. & H.),  
2 ♂.  
Manning, V, 23, 1914, (W. Stone),  
1 ♀, [A. N. S. P.].  
Sullivan Island, IX, 5, 1911, (R. & H.),  
2 ♀.  
Ashley Junction, VIII, 15, 1913, (R. &  
H.), 1 ♂, 1 ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
10 ♂, 6 ♀, 2 juv. ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T.  
Davis), 3 ♂, 6 ♀, 4 juv. ♂, 5 juv. ♀.  
Clayton, V, 18, 26, 1911, 2,000 feet,  
(J. C. Bradley), 1 ♂, 1 ♀.  
Atlanta, V, 15, 1911, (J. C. Bradley),  
1 ♂.

<sup>35</sup> The series of intermediates from Ortley, Atsion and Ocean City have been recorded as *T. parvipennis* by Rehn, *Ent. News*, XV, p. 326, (1904).



- Buckhead, VIII, 2, 1913, (R. & H.), 1 ♂, 1 ♀.  
 Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 7 ♂, 7 ♀, 1 juv. ♂.  
 Augusta, VII, 29, 1913, (R. & H.), 1 juv. ♂.  
 Summerville, 1 ♀, [Ga. State Cln.].  
 Macon, VII, 30-31, 1913, (R. & H.), 2 ♂, 1 ♀.  
 Columbus, VII, 16, 1913, (J. C. Bradley), 1 juv. ♂.  
 Jesup, IX, 1, 1911, (R. & H.), 6 ♂, 3 ♀, 1 juv. ♀.  
 Brunswick, VIII, 30, 1911, (R. & H.), 2 ♂, 4 ♀, 3 juv. ♀.  
 Hebardville, V, 15, 1915, (H.), 2 ♂, 1 ♀.  
 Suwannee Creek, VIII, 28, 1911, (R. & H.), 2 ♂, 2 ♀.  
 Mixon's Hammock, Okefenokee Swamp, V, 16, 1915, (H.), 4 ♂, 3 ♀, 1 juv. ♂.
- Homerville, VIII, 27, 1911, (R. & H.), 7 ♂, 8 ♀, 5 juv. ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 2 ♂, 4 ♀.  
 De Witt, VIII, 19, 1912, 1 ♀, [Ga. State Cln.].  
 Bainbridge, VII, 15, 1912, (J. C. Bradley), 1 ♀.  
 Spring Creek, VI, 7-23, VII, 16-29, 1911-12, (J. C. Bradley), 5 ♂, 5 ♀, 1 juv. ♂, 1 juv. ♀.
- Florida.*
- Jacksonville, (T. J. Pridley), 5 ♂, 10 ♀, [Hebard Cln.]; IX, 7, 1913, (W. T. Davis), 1 ♂.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 8 ♂, 2 ♀, 2 juv. ♀.  
 Live Oak, VIII, 26, 1911, (R. & H.), 1 juv. ♀.  
 St. Augustine, XI, 8, 1911, (G. P. Englehardt), 1 ♀, [B. I.].

Burmeister's name *polymorpha* has long been known to be a synonym of Say's *lateralis*, but since he described two forms, the caudate and abbreviate phases of the present insect, efforts have been made to retain this name for one of these. The uselessness of employing names for such phases has already been commented upon in the present paper.

Examination of extensive northern series of the present insect convinces us that they belong to a valid geographic race, *Tettigidea lateralis parvipennis* (Harris),<sup>36</sup> which is exceedingly close to the southern insect, but typical material from northern New England<sup>37</sup> may be separated from typical material of *T. lateralis lateralis*, described from Georgia and East Florida, by the following characters: form more robust; antennæ heavier, joints not more than twice as long as broad; frontal costa heavier; outline of dorsum of pronotum more decidedly broken cephalad of humeral angles, these angles more pronounced. Under this geographic race falls the name given for its caudate phase *T[tettigidea] parvipennis pennata* Morse.<sup>38</sup>

The large series before us show conclusively that, as the races approach one another in distribution, their differential characters become less and less appreciable; the material before us from the pine barrens and adjacent coastal strip of New Jersey, from Delaware, Maryland and northern Virginia, the series which we have recorded

<sup>36</sup> Morse discusses this question in *Jour. N. Y. Ent. Soc.*, III, p. 109, (1895).

<sup>37</sup> Material from numerous localities in Pennsylvania and from the Delaware River strip of New Jersey, now before us, is practically typical of the northern race.

<sup>38</sup> *Jour. N. Y. Ent. Soc.*, III, p. 109, (1895).

previously from Sulphur Springs (2,000 feet) and Mount Pisgah (4,500 feet), North Carolina, and the high country of northern Georgia, is all intermediate in character. Hancock has based his "variety" *Tettigidea medialis* on such material from southern Illinois, Missouri, Tennessee and Louisiana. We strongly question the Louisiana material being intermediate, for the material before us from that State is typical of *T. lateralis lateralis*. The uselessness of a name for intermediates between weakly defined geographic races does not require comment.

Material taken in heavy forest near streams or in swampy places shows a strong predominance of the abbreviate phase (Weldon and Lake Waccamaw, North Carolina; Thomasville, Georgia<sup>39</sup>). A female before us from Charlotte, North Carolina, has the wings abnormally produced, reaching 3.8 mm. beyond the caudate pronotum and 14 mm. in total length. The present insect is distributed everywhere through grasses and herbage of meadow, forest, swamp and marsh, usually found most numerous in and about damp situations. Of typical series before us 90.6% is caudate, this percentage excluding the three series discussed at the beginning of the paragraph. Besides the 367 individuals of the present species recorded above, we have before us 223 other specimens previously recorded from the southeastern United States and from as far west as Louisiana.

The largest series of intermediates before us (Washington, District of Columbia; Asheville, North Carolina) include a majority of specimens having the dorsal surface of the pronotum paler in coloration than the lateral lobes, ranging in different specimens from snuff brown and russet through clay color to cream color. Three of these specimens have the caudal femora broadly banded, four have a large spot in a similar position, while a number have the entire caudal femora of the same shade of the dorsum of the pronotum. Nearly half of the remaining large series of the present insect are unicolorous blackish brown, while almost all of the other specimens have the dorsum of the pronotum only slightly paler, usually unicolorous but occasionally somewhat mottled, and the caudal femora wholly uniform or inconspicuously marked. All of the males have the face and ventral portion of the lateral lobes of the pronotum nearly or quite clear white.

***Tettigidea armata*** Morse. Pl. XII, figs. 3, 4, 5.

1895. *Tettigidea armata depressa* Morse, Jour. N. Y. Ent. Soc., III, p. 107. [Vigo County, Indiana; Jacksonville, St. John's River and Ft. Reed, Florida; New Orleans, Louisiana].

<sup>39</sup> Recorded in part by Hebard as *Tettigidea lateralis* form *polymorpha*. Ent. News, XX, p. 115, (1909).

1908. *Tettigidea davis* Morse, Psyche, XV, p. 25. [Perth Amboy and Jamesburg, New Jersey; Staten Island, New York.]

*New York.*

Staten Island, IV, 4, VI, 5, IX, 1897-1900, (W. T. Davis), 2 ♂, 2 ♀, paratypes of *T. davis* Morse.

*New Jersey.*

2 ♂, [A. N. S. P.].  
Perth Amboy, V, 31, (W. T. Davis), 1 ♂, 1 ♀, paratypes of *T. davis* Morse.

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.), 1 juv. ♀.  
Wrightsville, IX, 7, 1911, (R. & H.), 4 ♂.  
Lake Waccamaw, IX, 8, 1911, (R. & H.), 14 ♂, 13 ♀, 2 juv. ♂, 4 juv. ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 11 ♂, 9 ♀, 6 juv. ♂, 10 juv. ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 ♂.

Clayton, 2,000 feet, V, 18-26, 1911, (J. C. Bradley), 1 ♂.

Groveland, VII, 28, 1913, (J. C. Bradley), 1 ♂.

Mixon's Hammock, Okefenokee Swamp, V, 16, 1915, (H.), 3 ♂, 6 ♀.  
Waycross, V, 8, 1911, (J. C. Bradley), 1 ♂.

Thomasville, II, 29, III, 29, IV, 1, 9, XII, 14, 1903-04, (H.), 6 ♂, 8 ♀.

Spring Creek, VI, 7-23, 1911, (J. C. Bradley), 1 ♀.

*Florida.*

Jacksonville, IV, 1885, (W. H. Ashmead), 1 ♂, paratype of *T. armata depressa* Morse, [Hebard Cln.].

*Louisiana.*

New Orleans, (Coleman), 4 ♀, 1 paratype of *T. armata depressa* Morse; (Saltan), 2 ♂, 2 ♀, [all Hebard Cln.].

As *Tettigidea armata depressa* is based solely on the abbreviate form of *armata*, the name is placed in the synonymy here.

Morse's *Tettigidea davis*, referred to in his original description as "an undescribed form or species of this genus, related to *armata* Morse," was separated by "the customary lack of a cuspidate point on the front margin of the pronotum . . . occasionally showing variations toward a cuspidate condition" and also slightly different tegmina, in other respects being typical of *armata*.

The series before us shows that the cuspidate condition of the cephalic margin of the dorsum of the pronotum is variable in the present insect; the following table of percentages gives the degree in the larger series we have examined.

	Strongly cuspidate (fig. 5).	Moderately cuspidate (fig. 4).	Weakly cuspidate.	Angulate, no cusp (fig. 3).
New Jersey.....	6	0	0	94
North Carolina.....	84	10	4	2
South Carolina.....	76	18	2	4
Georgia.....	70	28	2	0
Louisiana.....	100	0	0	0

The above figures show that, although there are indications of an incipient division in the present species, no valid geographic race yet exists. The table does not mean that four types of this species occur, for every shade of intergradation exists and the four columns

are solely for the convenience of the student; thus in the New Jersey series noticeable variation toward a weakly cuspidate condition is discernible, while in the material from Louisiana, though all are of the strongly cuspidate condition, the degree differs individually. Were it not for the fact that large series taken in restricted localities show in several instances forms typical of both *armata* and *davisi*, we would be led to consider the latter a valid geographic race. The only other characters given for *davisi*, tegminal abbreviation and size of the tegminal spot, are even more variable in the present species than the character discussed above, and we are consequently obliged to place *davisi* in the synonymy under the present species.

The abbreviate condition in the present species is more common than the caudate phase; this is constant throughout the insect's distribution and is very probably due to immediate environment. The degree of cuspidation of the cephalic margin of the pronotum is found to vary least in caudate individuals, none of these lacking the usual cuspidation.

The species has been found in scant swamp-grasses along "branch" (Fayetteville), common on bare, black swamp soil (Lake Waccamaw), occasional on grassy edges of swamp (Lake Waccamaw), in low, wet, sandy spots along streams (Florence, Wrightsville, Thomasville) and occasional on sandy soil covered with scant grasses and dead oak leaves (Mixon's Hammock). This insect prefers much more swampy situations than does *T. lateralis*, and the larger series here recorded were only secured by long and careful search in favorable and always much restricted areas. At Florence the following field note was made: "The Tettigideæ would often jump into the water and drift down with the current, quite motionless until they would strike a twig or root to which they would cling. Their appearance was exactly like a bit of twig or bark floating down stream." The species has been recorded from Staten Island, New York, south to extreme southern Florida and westward as far as Riverside, Illinois; Howe, Oklahoma, and Dallas, Texas.

**Radnotatum brevipenne brevipenne** (Thomas).

*South Carolina.*

Yemassee, IX, 4, 1911, (R. & H.),  
2 juv. ♂, 4 juv. ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.),  
5 juv. ♂, 3 juv. ♀.  
Warm Springs, 850-1,200 feet, VIII,  
9-10, 1913, (R.), 5 juv. ♂, 9 juv. ♀.

Macon, V, 1 ♂, 1 ♀, [U. S. N. M.];  
VII, 30, 1913, (R. & H.), 1 ♂,  
2 juv. ♂, 2 juv. ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
4 juv. ♂.  
Sandfly, IX, 3, 1911, (R. & H.), 2  
juv. ♂.  
Jesup, IX, 1, 1911, (R. & H.), 2 juv. ♂,  
1 juv. ♀; XII, 1908, (H.), 1 juv. ♂,  
1 juv. ♀.

Brunswick, VIII, 30, 1911, (H.),  
1 juv. ♀.  
Homerville, VIII, 27, 1911, (R. & H.)  
2 juv. ♂, 5 juv. ♀.  
Hebardville, V, 15, 1915, (H.), 6 ♂,  
7 ♀.  
Suwannee Creek, VIII, 28, 1911, (R. &  
H.), 2 juv. ♂, 2 juv. ♀.  
Billy's Island, VI, VII, 1912, 2 ♂;  
IX, 1-5, 1913, 1 juv. ♂, (all J. C.  
Bradley).  
Honey Island, VI, 1, 1912, (J. C.  
Bradley), 2 ♀.  
Albany, VIII, 1, 1913, (R. & H.),  
1 juv. ♂, 4 juv. ♀.  
Spring Creek, VI, 7-23, 1911, (J. C.  
Bradley), 1 ♀.

*Florida.*

Jacksonville, V, 1885, (W. H. Ash-  
mead), 1 ♀. [Hebard Cln.]; VIII,  
25, 1911, (R. & H.), 1 juv. ♂, 1  
juv. ♀; XI, 3, 5, 1913, (W. T.  
Davis), 1 ♀, 1 juv. ♂, 1 juv. ♀.  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 2 juv. ♂.  
Pablo Beach, XI, 4, 1911, (W. T.  
Davis), 1 juv. ♂, 1 juv. ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
few very small juv. seen.  
Cedar Keys, VI, 1 ♂, [U. S. N. M.].

The immature examples before us taken in August and September are almost all in the instar in which females are 17-18 mm. in length, excepting those from Augusta, Warm Springs, Macon and Albany, Georgia, in which series females average 13 mm. and five from Augusta and Albany average 8 mm. The majority of young from Georgia and northern Florida taken in November and December show little increase in size over those taken in August, females measuring 20-21 mm. in length, though the following instars are also represented by females measuring 26 and 32 mm., respectively. It is in these later stages of development that the insects remain, and are active except on the coldest days, throughout the winter in southern Georgia and northern Florida, adults beginning to appear toward the middle of April. The presence in the series of an adult female taken in November shows that occasional mature individuals continue even into the early winter, but evidence shown by past and present study gives convincing proof that the species appears adult over the greater part of its range in late April and mature individuals have become scarce as early as August. In central Florida, however, the species passes the winter in the adult condition.

An interesting feature in the development of the male subgenital plate is demonstrated by the present series. Immature males, until they have reached a length of 12.5 mm., have this plate very short, not projecting beyond the apex of the abdomen, with caudal margin acute-angulate emarginate; in the following instar (length 18 mm.) the attenuate and greatly produced subgenital plate of the type of the adult insect appears.

In the large series of immature examples before us, those of the brown color phase are somewhat more numerous than those marked with green.



The species within its range is widely distributed throughout the undergrowth of the long-leaf pine forests and has sometimes been observed to frequent somewhat damp situations. It has also been found in short grass of waste land (below fall line, Augusta), in sandy tract of scrub oaks (just above fall line, Augusta), in mixed oak and pine woods suggesting New Jersey pine barrens (Warm Springs) and in sandy field of short grass (Atlantic Beach). In central Florida the species intergrades with its geographic race *R. brevipenne peninsulare*; north of that State the previous known records for the species were Savannah, Waycross and Thomasville, Georgia, and Greenville, Alabama.

***Tryxalis brevicornis* (Linnaeus).**

*Maryland.*

Chestertown, VIII, 16-27, 1899-1902, (E. G. Vanatta), 4 ♂, 9 ♀, [A. N. S. P.].

Queen Anne County, VIII, 7, 1902, (E. G. Vanatta), 1 ♂, [A. N. S. P.].  
Washington, D. C., IX, 1883, 2 ♂, [Hebard Cln.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 2 ♂, 2 juv. ♂.  
Natural Bridge, IX, 12-13, 1907, (B. Long), 1 ♀, [A. N. S. P.].  
Petersburg, VII, 23, 1913, (R. & H.), 1 juv. ♀.

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.), 1 ♂, 2 ♀.  
Greensboro, VII, 26, 1913, (R. & H.), 1 juv. ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 juv. ♂.  
Florence, IX, 6, 1911, (R. & H.), 4 ♂.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 ♂, 1 juv. ♂.  
Thompson's Mills, X, 1908-09, (H. A. Allard), 2 ♂, 2 ♀, [U. S. N. M.].  
Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 1 ♂, 2 ♀.  
Atlanta, VII, 29, 1910, 1 ♂, [Ga. State Cln.].  
Silver Lake, VIII, 10, 1913, 1 juv. ♀, [Ga. State Cln.].  
Buckhead, VIII, 2, 1913, (R. & H.), 1 ♂.  
Savannah, VIII, 7, 1878, (Grote), 1 ♂, [U. S. N. M.].  
Columbus, VII, 16, 1913, (J. C. Bradley), 1 ♂.  
Chase Prairie, Okefenokee Swamp, IX, 5, 1913, (J. C. Bradley), 1 ♂.

*Alabama.*

Decatur, (Shimek), 1 ♀, [Hebard Cln.].

*Florida.*

Atlantic Beach, VIII, 24, 1911, (R. & H.), 4 ♂.

Material from the Atlantic coast shows a slight increase in size southward, the more robust individuals from southern Georgia and from Florida have somewhat larger eyes and a broader vertex. Males measure in length as follows: Anglesea, New Jersey, 19-22 mm.; Asheville, North Carolina (2,000 feet), 19.7-22.8; near Atlanta, Georgia (1,000 feet), 19.2-21.6; Florence, South Carolina, 21.7-23; Atlantic Beach, Florida, 24.3-25.3 mm.

Five specimens are in the brown phase, two males and two young from Fredericksburg and one female from Fayetteville; all of the other specimens are of the more usual coloration.



The present insect is very locally distributed in marshland. At Fredericksburg it was found in high wet grasses in an upland depression. The species has been recorded from Long Island, New York, and Point Pelee, Ontario, south to the Argentine Republic.

***Mermiria alacris* Scudder.**

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.; scarce in gallberry and wire-grass under scattered short-leaf pines), 5♂.  
 Southern Pines, early XI, 1908, (A. H. Manee), 1♂, 1♀; 1905, 2♂, 1♀, [all N. C. Dept. Agr.].  
 Wilmington, IX, 8, 1911, (R. & H.; in long-leaf pine woods), 1♂.  
 Winter Park, IX, 7, 1911, (R. & H.; common in pine woods), 11♂, 12♀.  
 Wrightsville, IX, 7, 1911, (R. & H.; in grasses in short-leaf pine woods), 1♂, 1♀.  
 Lake Waccamaw, IX, 8, 1911, (R. & H.; in short-leaf pine woods undergrowth), 1♂.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.; in grass bunches on bare area), 2 juv. ♀.  
 Ashley Junction, VIII, 15, 1913, (R.; in tall brush in long-leaf pine woods), 1♂.  
 Yemassee, IX, 4, 1911, (R. & H.; in undergrowth in short-leaf pine woods), 1♂.

*Georgia.*

Toccoa, VIII, 4-5, 1913, (H.; in

grass, vines and oak sprouts in clearing), 1 juv. ♀.  
 Augusta, VII, 29, 1913, (R. & H.; in grasses in sandy scrub-oak area and in short grasses in old overgrown fields), 1♂, 8 juv. ♂, 1 juv. ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 4 juv. ♂, 4 juv. ♀.  
 Jesup, IX, 1, 1911, (R. & H.; in pine woods undergrowth), 4♂.  
 Billy's Island, VI and VII, 1912, (J. C. Bradley), 1♂, 5 juv. ♂, 3 juv. ♀.  
 Albany, IX, 1910, 1♀, [Ga. State Cln.]; VIII, 1, 1913, (R. & H.; in undergrowth of pine woods), 2♂.  
 Bainbridge, (J. C. Bradley), 1♂, [Ga. State Cln.].  
 Spring Creek, VII, 16-29, 1912, (J. C. Bradley), 2♂, 3 juv. ♂, 1 juv. ♀, [Ga. State Cln.].

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.; in undergrowth of pine and among scrub oak on very sandy soil), 20♂, 7♀; (T. J. Priddey), 1♂, [Hebard Cln.]; VIII, 1885 and 1886, (W. H. Ashmead), 1♂, 2♀, [Hebard Cln.]; IX, 28, 1913, (W. T. Davis), 1♂ and 1♀ in coitu, [Davis Cln.].  
 Titusville, XI, 8, 1911, (W. T. Davis), 1♀, [Davis Cln.].

We have examined, in the Scudder Collection, two males and three females of the original series of two males and four females on which Scudder founded his *Mermiria vigilans*. In consequence we can fully endorse Morse's synonymy of *vigilans* under the present species.<sup>40</sup> At a later date we will speak in more detail of the variability of this interesting dry-land form.

The known distribution of *alacris* in the eastern States extends from east-central and central (Salisbury, on the basis of immature individuals not seen by us) North Carolina and northern Georgia (Toccoa), south to central Florida (Cedar Keys, Sanford and Titusville).

<sup>40</sup> Carnegie Inst. Wash., Publ. 68, p. 27, (1907).

**Mermiria intertexta** Scudder.*Virginia.*

Ocean View, VIII, 9, (A. N. Caudell),  
4 ♂, 1 ♀, [U. S. N. M.].

*North Carolina.*

Wrightsville, IX, 7, 1911, (R. & H.;  
in salt marsh vegetation), 1 ♂.  
Smith Island, X, 1906, (F. Sherman),  
2 ♀, [N. C. Dept. Agr.].

*South Carolina.*

Coast of South Carolina, 1 ♂, [Hebard  
Cln.].  
Isle of Palms, VIII, 15, 1913, (R.; in  
shin oak, bayberry, palmetto and  
briar thickets among dunes), 1 ♂,  
1 ♀.

*Georgia.*

Tybee Island, IX, 2, 1911, (R. & H.;  
fairly plentiful in high grasses

growing in water on edge of salt  
marsh), 27 ♂, 12 ♀; VII, 26, 1913,  
1 juv. ♀, [Ga. State Cln.].

*Florida.*

Jacksonville, (T. J. Priddey), 2 ♂,  
[Hebard Cln.].  
South Jacksonville, IX, 7, 1913,  
(W. T. Davis), 5 ♂, 2 ♀, [Davis  
Cln.].  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.; fairly common in high saw grass  
and reeds in marsh), 11 ♂, 8 ♀.  
Pablo Beach, IX, 3-17, 1913, (W. T.  
Davis), 7 ♂, 5 ♀, [Davis Cln.].  
Long Boat, Sarasota Key, 1 ♂, [Ga.  
State Cln.].  
Useppa Island, Charlotte Harbor, V,  
17-19, 1915, (H.), 1 juv. ♂, [Hebard  
Cln.].

This is the species recorded by us from Pablo Beach and Cedar Keys, Florida, as *vigilans*.<sup>41</sup> It is distinctly a hygrophilous species, found in both fresh and salt marsh situations, but occasionally straying into adjacent dune vegetation.

**Mermiria bivittata** Serville.

Billy's Island, Georgia, VII, 1912, (J. C. Bradley), 1 ♀, [A. N. S. P.].

In addition to this specimen, we have before us six males and two females labelled, "Georgia. H. K. Morrison," from the Scudder Collection and that of the United States National Museum, those from the former having been correctly determined as this species by Scudder. The male from Fort Barrancas, Florida, correctly recorded by Morse,<sup>42</sup> is also before us. The single male specimen from Pablo Beach, Florida, recorded by the present authors as *intertexta*,<sup>43</sup> belongs to this species, the exact relationship of which has never been clearly determined. In the near future we intend to critically study this genus in its entirety.

The present species is only known in the southeastern States, i.e., east of Alabama, from the localities mentioned above and from Havelock, North Carolina (Sherman and Brimley).

**Syrbula admirabilis** (Uhler).*Virginia.*

Arlington, VII, 9, 1914, (H.), 1 juv. ♂.  
Fredericksburg, VII, 20, 1913, (R. &  
H.), 1 ♂, 1 juv. ♂, 4 juv. ♀.

Orange, VII, 21, 1913, (R. & H.), 1 ♂,  
1 ♀, 2 juv. ♂.  
Lynchburg, VII, 22, 1913, (R. & H.),  
2 ♂, 1 juv. ♂, 2 juv. ♀.

<sup>41</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 286, (1907).

<sup>42</sup> Carnegie Inst. Wash., Publ. 18, p. 29, (1904).

<sup>43</sup> PROC. ACAD. NAT. SCI. PHILA. 1907 p. 286, (1907).

Petersburg, VII, 23, 1913, (R. & H.),  
1 juv. ♂.  
Virginia Beach, IX, 15, 1907, (B.  
Long), 1 ♀, [A. N. S. P.].

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 5 ♂,  
1 ♀, 1 juv. ♂.  
Greensboro, VII, 26, 1913, (R. & H.),  
1 juv. ♂, 3 juv. ♀.  
Goldsboro, VII, 25, 1913, (R. & H.),  
1 ♂, 1 juv. ♂, 2 juv. ♀.  
Charlotte, VII, 27, 1913, (R. & H.),  
1 ♂, 2 juv. ♀.  
Fayetteville, IX, 9, 1911, (R. & H.),  
2 ♂, 3 ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
2 ♀.  
Wrightsville, IX, 7, 1911, (R. & H.),  
1 ♂.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 ♂,  
1 juv. ♂.  
Florence, IX, 6, 1911, (R. & H.), 8 ♂,  
2 ♀.  
Columbia, VII, 28, 1913, (R. & H.),  
1 ♂, 1 juv. ♂, 1 juv. ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
2 ♂, 2 ♀.

*Georgia.*

Dalton, VIII, 7, 1913, (R.), 2 juv. ♀.  
Toccoa, VIII, 4-5, 1913, (H.), 3 ♂,  
1 ♀.  
Currahee Mountain, VIII, 5, 1913,  
(H.), 1 ♂, 2 ♀.  
Thompson's Mills, X, 1909, (H. A.  
Allard), 2 ♂, [U. S. N. M.].  
Buckhead, VIII, 2, 1913, (R. & H.),  
1 ♂, 1 ♀, 1 juv. ♀.

Vicinity of Stone Mountain, VIII, 3,  
1913, (Bradley, R. & H.), 4 ♂, 1 ♀.  
Stone Mountain, VIII, 3, 1913, (R. &  
H.), 1 ♂, 1 ♀.  
Augusta, VII, 29, 1913, (R. & H.),  
2 ♂, 5 juv. ♂.  
Warm Springs, VIII, 9-10, 1913, (R.),  
1 ♂.  
Macon, VII, 30-31, 1913, (R. & H.),  
8 ♂, 3 ♀, 2 juv. ♀.  
Columbus, VII, 16, 1913, (J. C. Brad-  
ley), 1 ♂.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
1 ♀.  
Jesup, IX, 1, 1911, (R. & H.), 1 ♂,  
2 ♀.  
Brunswick, VIII, 30, 1911, (H.), 1 ♂.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 4 ♀.  
Homerville, VIII, 27, 1911, (R. & H.),  
8 ♂.  
Suwannee Creek, VIII, 28, 1911, (R. &  
H.), 1 ♂.  
Billy's Island, IX, 1-5, 1913, (J. C.  
Bradley), 1 ♂.  
Albany, VIII, 1, 1913, (R. & H.),  
6 ♂, 1 ♀, 2 juv. ♀.  
Bainbridge, IX, 17-X, 19, 1910,  
(J. C. Bradley), 1 ♂.  
Spring Creek, VI, VII, VIII, 1911-13,  
(J. C. Bradley), 10 ♂, 6 ♀, 1 juv. ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
10 ♂, 8 ♀; IX, 7, 1913, (W. T.  
Davis), 2 ♂.  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 4 ♂, 1 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
2 ♂.

A decided increase in size is found in the southward distribution of the present species. A female from North Woodbury, New Jersey, is exceptionally large for material from that State. Length of females: West Creek, New Jersey, 32.7-33.4; North Woodbury, N. J., 40.4; Asheville, N. C. (2,000 feet), 32.5-35; Fayetteville, N. C., 37.5-39; Jacksonville, Fla., 38.5-40; Miami, Fla., 45.2 mm.

In the entire series of this species nearly all the adult males are in the brown phase, very few showing any trace of green or greenish coloration. In these few specimens this color is obscure and confined to the head and lateral lobes of the pronotum. Of the adult females before us, eleven are of the brown phase, the paler tegminal markings alone suffused with greenish in several of these, ten are intermediate between the brown and green phases, while sixty-eight are of the green phase. It is interesting to note that in

the present series of young, twenty-five are of the green phase and fourteen are of the brown, irrespective of sex.

The species was found most abundant on sandy soil overgrown with wire-grass and other low plants in areas of scrub oak and pine (Jacksonville), but was also found widely distributed through the undergrowth of pine and mixed forests and in fields and weedy areas, particularly in somewhat damp situations. The insect is known on the Atlantic coast from Medford, New Jersey, south to Miami, Florida, and is found in the Appalachian valleys as high as 2,000 feet; north of Maryland the species is decidedly scarce, and it is known from southern Florida from but a single specimen.

**Eritettix simplex** (Seudder).

*Maryland.*

Laurel, V, 14, VI, 4, 1911, (Marshall),  
21 ♂, 9 ♀, [U. S. N. M.],  
Glen Echo, VII, 10, 1914, (H.), 1 ♀.  
Piney point, VI, 17, (Pergande), 1 ♀,  
[U. S. N. M.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. &  
H.), 3 juv. ♂, 1 juv. ♀.  
Orange, VII, 21, 1913, (R. & H.),  
3 juv. ♂.  
Lynchburg, VII, 22, 1913, (R. & H.),  
2 juv. ♂, 1 juv. ♀.  
Petersburg, VII, 23, 1913, (R. & H.),  
2 juv. ♂.

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.),  
3 juv. ♂, 2 juv. ♀.  
Black Mountain, VI, 1912, (W. Beu-  
tenmüller), 1 ♀, [Davis Cln.].

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.),  
1 juv. ♂.

*Georgia.*

Clayton, VI, 1909, (W. T. Davis),  
1 ♂.  
Thompson's Mills, IV, 1910, (H. A.  
Allard), 2 ♂, 1 ♀, [U. S. N. M.].  
Buckhead, VIII, 2, 1913, (R. & H.),  
2 juv. ♂, 2 juv. ♀.  
Augusta, VII, 29, 1913, (R. & H.),  
1 juv. ♂, 1 juv. ♀.

The series of young from Fredericksburg, Orange and Petersburg average about 6.5 mm. in length, those from Lynchburg and Greensboro 7.2, while the remainder average about 8.4 mm. In such very early stages we find supplementary carinæ weakly indicated on the pronotum in five of the seventeen smallest specimens, and somewhat more strongly but to varying degrees in five of the seven larger young, while one of the latter has these carinæ very weakly continued on the head. All of these immature examples are of the more normal color forms, excepting one male from Atlanta which has the dorsal surface of head and pronotum uniformly black. These young individuals have the median pronotal stripe present in the specimens which have indications of supplementary carinæ; examination of the series of one hundred and fifty-nine adults of the present species in the collections before us shows that the individuals having a strongly defined median stripe have strongly defined supplementary carinæ, while those having the dorsum of the pronotum unicolorous wholly lack supplementary carinæ.

The present series of very small young all have short, flattened antennae with apices weakly clavate.

The southeastern limits of the known distribution of the species are defined by some of the records given above.

The present material was taken in campestral surroundings; in short grasses, usually on uplands, but on the flat country just below the fall line at Augusta. The young were abundant at Greensboro, elsewhere they were occasional or very scarce.

***Macneillia obscura*** Scudder.

Live Oak, Florida, VIII, 26, 1911, (R. & H.), 2 ♀, 2 juv. ♂.  
Gotha, Fla., 1 ♂, [U. S. N. M.].

Both of the above females are vandyke brown in general coloration, one has the dorsal median section of the pronotum between the supplementary carinae (which in this specimen are distinct) and the corresponding portion of the head clay color; the other specimen is unicolorous, the lateral carinae alone outlined in clay color, and has no indication whatever of supplementary carinae.<sup>44</sup> Study of the series of forty-five adults and young of this rare species in the collections before us, shows that the supplementary carinae, when present, become more decided as a median stripe becomes more prominent. Specimens having a wholly unicolorous dorsum of the pronotum entirely lack supplementary carinae; we find this to be likewise true in the species of the genus *Eritettix*.

The specimens from Live Oak, the most northern locality at which this insect has been found, were taken on the side of a depression near a sink hole, where the deforested ground was covered with wire-grass and clumps of a dwarf oak growing knee-high.

***Amblytropidia occidentalis*** (Saussure).

*North Carolina.*

Goldsboro, VII, 25, 1913, (R. & H.),  
1 juv. ♀.  
Fayetteville, IX, 9, 1911, (R. & H.),  
2 juv. ♂, 3 juv. ♀.  
Lake Ellis, V, 14, 1906, 1 ♂, [U. S.  
N. M.].  
Wilmington, IX, 8, 1911, (R. & H.),  
1 juv. ♂.  
Winter Park, IX, 7, 1911, (R. & H.),  
3 juv. ♀.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 1 juv. ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.),  
1 juv. ♀.  
Florence, IX, 6, 1911, (R. & H.),  
2 ♂, 2 juv. ♂, 7 juv. ♀.  
Columbia, VII, 29, 1913, (R. & H.),  
1 juv. ♀.  
Manning, V, 28, 1914, (W. Stone),  
3 ♂, 1 ♀, [A. N. S. P.].  
Ashley Junction, VIII, 15, 1913, (R.),  
9 juv. ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
4 juv. ♂, 1 juv. ♀.

<sup>44</sup> Unfortunately the authors in speaking of such unicolorous specimens used "lateral carinae" where "supplementary carinae" was meant. PROC. ACAD. NAT. SCI. PHILA., 1912. p. 251, (1912).

*Georgia.*

- Toccoa, 1,094 feet, VIII, 4-5, 1913, (H.), 2 juv. ♀.  
 Vicinity of Stone Mountain, 1,000 feet, VIII, 3, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 2 juv. ♀.  
 Warm Springs, 850-1,200 feet, VII, 9-10, 1913, (R.), 1 juv. ♂, 1 juv. ♀.  
 Augusta, VII, 29, 1913, (R. & H.), 4 juv. ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 2 juv. ♀.  
 Isle of Hope, IX, 3, 1911, (R. & H.), 2 juv. ♂, 2 juv. ♀.  
 Sandfly, IX, 3, 1911, (R. & H.), 2 juv. ♂, 2 juv. ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 1 juv. ♂; XII, 1908, (H.), 1 ♂, 2 ♀.  
 Homerville, VIII, 27, 1911, (R. & H.), 1 juv. ♂.
- Hebardville, V, 15, 1915, (H.), 1 ♂.  
 Suwannee Creek, VIII, 28, 1911, (R. & H.), 2 juv. ♀.  
 Mixon's Hammock, Okefenokee Swamp, V, 16, 1915, (H.), 1 ♀.  
 Billy's Island, VI, 1912, (J. C. Bradley), 4 ♂, 2 ♀.  
 Honey Island, VI, 1912, (J. C. Bradley), 3 ♂, 3 ♀.

*Florida.*

- Jacksonville, VIII, 1885, (W. H. Ashmead), 3 juv. ♂, 2 juv. ♀, [Hebard Cln.].  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 1 juv. ♂.  
 Live Oak, VIII, 26, 1911, (R. & H.), 1 juv. ♀.  
 Daytona, XI, 11, 1911, (G. P. Englehardt), 2 ♀, [B. I.].

There is little individual and almost no geographic variation in size in the adults of the above series, the specimens from Billy's and Honey Islands being of similar dimensions to individuals from Raleigh, North Carolina.

The usual polychromatism is noticed in the adults. The smaller young show both green and brown phases, the presence of the former phase, which is never found in the adult condition, apparently pointing to the greater primitiveness of this type of coloration. In the earlier stages immature examples show a decided multilineate coloration accompanied by an infuscation of the face, which is quite distinctive, little suggestive, however, of the coloration of the adult. As growth progresses the browns become more evident, and in the third instar preceding maturity the greens have largely disappeared. In the second instar preceding maturity such peculiarities as the black edgings of the median carina of the pronotum, occasionally found in adults, become evident.

While generally taken in grass and brush in pine or pine and oak woods, the young of this species are occasionally found in oak groves.

*Orphulella pelidna* (Burmeister).*Maryland.*

- Glen Echo, VII, 10, 1914, (H.), 1 ♂.

*Virginia.*

- Arlington, VII, 9, 1914, (H.), 1 juv. ♀.  
 Fredericksburg, VII, 20, 1913, (R. & H.), 14 ♂, 16 ♀.  
 Lynchburg, VII, 22, 1913, (R. & H.), 5 ♂, 3 ♀.

- Petersburg, VII, 23, 1913, (R. & H.), 5 ♂, 5 ♀.

*North Carolina.*

- Weldon, VII, 24, 1913, (R. & H.), 2 ♂, 4 ♀.  
 Greensboro, VII, 26, 1913, (R. & H.), 5 ♂, 3 ♀.  
 Charlotte, VII, 27, 1913, (R. & H.), 3 ♂, 2 ♀.



Fayetteville, IX, 9, 1911, (R. & H.),  
2 ♂, 4 ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
10 ♂, 10 ♀.  
Wrightsville, IX, 7, 1911, (R. & H.),  
2 ♀.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 1 ♂, 4 ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 ♀.  
Columbia, VII, 28, 1913, (R. & H.),  
1 ♂, 3 ♀.  
Florence, IX, 6, 1913, (R. & H.),  
3 ♂, 7 ♀.  
Sumter, V, 30, 1914, (W. Stone),  
1 ♀, [A. N. S. P.].  
Manning, V, 23 to 30, 1914, (W.  
Stone), 1 ♂, 1 ♀, 4 juv. ♀, [A. N.  
S. P.].  
Isle of Palms, VIII, 15, 1913, (R.),  
3 ♂, 3 ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
12 ♂, 12 ♀.

*Georgia.*

Clayton, 2,000-3,700 feet, VII, 1910,  
(W. T. Davis), 1 ♀.  
Toccoa, VIII, 4-5, 1913, (H.), 3 ♂,  
2 ♀.  
Currahee Mountain, 1,700 feet, VIII, 5,  
1913, (H.), 1 ♂, 1 ♀.  
Dalton, VIII, 7, 1913, (R.), 1 ♂,  
1 juv. ♀.  
Jasper, VIII, 5, 1913, (R.), 2 ♂, 2 ♀.  
Austell, VIII, 6, 1910, 1 ♂, [Ga.  
State Cln.].  
Atlanta, VI, 26, 1913, 1 ♂, 1 ♀, [Ga.  
State Cln.].  
Buckhead, VIII, 2, 1913, (R. & H.),  
1 ♂, 1 ♀.  
Vicinity of Stone Mountain, VIII, 3,  
1913, (R. & H.), 4 ♂, 5 ♀.  
Thompson's Mills, X, 1909, (H. A.  
Allard), 2 ♂, 8 ♀, [U. S. N. M.].  
Macon, VII, 30-31, 1913, (R. & H.),  
6 ♂, 7 ♀.  
Augusta, VII, 29, 1913, (R. & H.),  
4 ♂, 11 ♀.  
Monticello, VIII, 2, 1905, (Titus),  
1 ♂, [U. S. N. M.].  
Warm Springs, VIII, 9-10, 1913, (R.),  
2 ♂, 7 ♀.  
Albany, VIII, 1, 1913, (R. & H.),  
5 ♂, 8 ♀.  
Tifton, IX, 8, 1910, 1 ♀, [Ga. State  
Cln.].  
Bainbridge, VII, 15, 1912; IX, 3-7,  
IX, 17-X, 19, 1910, (J. C. Bradley),  
6 ♂, 7 ♀.

Spring Creek, VI, 7-23, 1911, VII,  
16-29, 1912, VIII, 26-28, 1913,  
(J. C. Bradley), 18 ♂, 20 ♀.  
Homerville, VIII, 27, 1911, (R. & H.),  
13 ♂, 6 ♀.  
Waycross, V, 11, 1910, 1 ♂, [Ga.  
State Cln.].  
Hebardville, V, 15, 1915, (H.), 1 ♂,  
1 ♀.  
Suwannee Creek, VIII, 28, 1911,  
(R. & H.), 5 ♂, 4 ♀.  
Billy's Island, V, 28-VII, 1912, IX,  
1-5, 1913, (J. C. Bradley), 56 ♂,  
37 ♀, 2 juv. ♂, 1 juv. ♀.  
Jordans, Billy's Island, VIII, 31, 1913,  
(J. C. Bradley), 2 ♂, 1 ♀, 1 juv. ♀.  
Honey Island, VI, 1, 1912, (J. C.  
Bradley), 1 ♂, 1 ♀, 1 juv. ♀.  
Mixon's Hammock, VI, 16, 1912,  
(J. C. Bradley), 1 ♂.  
Fargo, VIII, 31, 1913, (J. C. Bradley),  
1 juv. ♀.  
Jesup, IX, 1, 1911, (R. & H.), 3 ♂,  
7 ♀.  
Tybee Island, IX, 2, 1911, (R. & H.),  
4 ♂, 2 ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
3 ♂, 3 ♀.  
Sandfly, IX, 2, 1911, (R. & H.), 2 ♂,  
2 ♀.  
Brunswick, VIII, 30, 1911, (H.),  
1 ♂, 1 ♀.  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 7 ♂, 8 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 7 ♂, 3 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. &  
H.), 6 ♂, 4 ♀; XI, 3 and 5, 1911,  
(W. T. Davis), 2 ♂, 4 ♀.  
Atlantic Beach, VIII, 24-25, 1911,  
(R. & H.), 6 ♂, 19 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
3 ♂, 6 ♀.  
Lakeland, V, 4, 1912, XI, 8, 1911,  
(W. T. Davis), 5 ♂, 5 ♀.  
Punta Gorda, XI, 11-16, 1911, (W. T.  
Davis), 3 ♂, 5 ♀.  
Fort Myers, III, 30 and IV, 24, 1912,  
(W. T. Davis), 1 ♂, 1 ♀.  
La Belle, IV, 27, 1912, (W. T. Davis),  
1 ♀.  
South Bay, Lake Okeechobee, V, 1  
and 2, 1912, (W. T. Davis), 1 ♂,  
1 ♀.  
Everglade, IV, 5, 1912, (W. T. Davis),  
1 ♀.  
Deep Lake, IV, 13, 1912, (W. T.  
Davis), 1 ♂.

The present series of five hundred and thirty-five specimens exhibits the almost endless variation in size, the numerous structural and proportional modifications and all the pure and compound color phases found in this extremely plastic species. In the matter of wing length we find both one of the most abbreviate females and the most macropterous one of the same sex in the Lynchburg series. The macropterous one of these measures 22.5 mm. in length of body and 21.5 mm. in length of tegmen, while the abbreviate one has the same proportions, 21.5 and 17.4, respectively. The only noteworthy color modification is seen in the Isle of Palms series, which, taken among the dunes of a barrier beach, is prevailingly grayish, two of the females having almost no distinct markings, in this respect much resembling *O. olivacea*, with which this species was there associated.

Certain specimens from Punta Gorda, Florida, particularly one female, show a tendency toward the new *O. halophila* occurring in the same general region, but this is purely one of general resemblance and not of close affinity. This apparent divergence from the basic type is not true of all the individuals from that locality, as others are perfectly typical of *pelidna*.

As to the synonymy of *Orphulella pratorum* Scudder with the present species, it seems only necessary to say that the more material seen by us the more certain are we of the correctness of the association.

This species was found over the whole region treated in the present paper, frequenting the greatest variety of habitats, from salt marsh grass (in company with *olivacea* at Tybee Island and Wrightsville), to barren hillsides (Fredericksburg) and mountain slopes under timber in a luxuriant undergrowth of grasses, vines and oak sprouts (Currahee Mountain). The undergrowth in pine woods, *i.e.*, gallberry, bunch and wire-grass, seems to be more preferred than campestrian situations. At Isle of Palms this species and *olivacea* were found in the dry hollows of dunes among vegetation composed of bayberry, *Myrica cerifera*, scrubby oak, briars and cabbage palmetto, *Sabal palmetto*.

***Orphulella olivacea* (Morse).**

*Virginia.*

Franklin, Accomac County, IX, 22, 1907, (B. Long), 1 ♀, [A. N. S. P.].

*North Carolina.*

Wrightsville, IX, 7, 1911, (R. & H.), 2 ♀.

*South Carolina.*

Isle of Palms, VIII, 15, 1913, (R.), 1 ♂.

*Georgia.*

Tybee Island, IX, 2, 1911, (R. & H.), 14 ♂, 18 ♀.

Sandy, IX, 3, 1911, (R. & H.), 1 ♂.

*Florida*,<sup>45</sup>

Pablo Beach, VIII, 12, 1905, (R. & H.),  
 1 ♂.  
 Cedar Keys, VIII, 15, 1905, (R. & H.),  
 11 ♂, 12 ♀.

*Texas*.

Galveston, VII, 19-21, 1912, (H.),  
 11 ♂, 5 ♀.  
 Virginia Point, VII, 21, 1912, (H.),  
 8 ♂, 12 ♀, 1 juv. ♀.  
 Corpus Christi, VII, 29, 1912, (H.),  
 2 ♀.

The study of the present series of this and the following species, as well as material of *olivacea* from New England and New Jersey brings out three points of interest. First, that *olivacea* increases in size southward, the Tybee Island and Cedar Keys specimens being appreciably larger than New England and New Jersey individuals. Second, the range of this species covers the coastal marshes and portions of the beaches from southern New England (Norwich, Connecticut) south to north Florida (Pablo Beach), also along the Gulf coast from Cedar Keys, Florida, to Texas, as far south as Corpus Christi, the two portions of the range being completely separated. Third, that in similar environment in south-central and southern Florida and southern Texas, north to Corpus Christi, *olivacea* is replaced by an allied species, which does not intergrade with the more northern form and is found associated with it at Corpus Christi.

A critical examination of all of our material from fifteen localities extending from Connecticut to Texas shows a regular size increase in both sexes as one proceeds southward to northern Florida, the size increase being accompanied by a broadening and blunting of the fastigium, specimens from Greenwich, Connecticut, and Cedar Keys, Florida, being quite different in the latter feature. Considering the Texan material, it is seen that the beach specimens (Galveston and Corpus Christi) are somewhat smaller than individuals taken in the salt marsh of the bays (Virginia Point), the series from the latter place averaging as large as the Cedar Keys specimens taken in the same environment. Measurements (in millimeters) of average individuals and pairs from a number of localities are as follows:

	Greenwich, Conn. (Paratypes).		Atlantic City, N. J.		Franklin City, Va.
	♂	♀	♂	♀	♀
Length of body.....	17.	21.5	17.8	24.3	26.5
Length of pronotum.....	3.2	3.9	3.7	4.3	5.
Length of tegmen.....	14.6	16.8	15.	19.8	21.4

<sup>45</sup> These specimens have been recorded by the authors (PROC. ACAD. NAT. SCI. PHILA., 1907, p. 287, (1907)) as *O. pelidna*? These individuals are extremely large *olivacea*, differing also, as here shown, from northern specimens of the species in having the fastigium somewhat aberrant.

	Wrightsville, N. C.	Isle of Palms, S. C.	Tybee Island, Ga.	
	♀	♂	♂	♀
Length of body.....	27.8	17.4	19.3	26.2
Length of pronotum.....	4.9	3.4	4.	5.
Length of tegmen.....	21.9	15.7	16.7	21.5
	Pablo Beach, Fla.	Cedar Keys, Fla.		Galveston, Tex.
	♂	♂	♀	♂
Length of body.....	20.3	20.	27.	18.5
Length of pronotum.....	4.1	4.1	5.	3.8
Length of tegmen.....	18.1	16.9	22.8	16.3
		Virginia Point, Tex.		Corpus Christi, Tex.
		♂	♀	♀
Length of body.....		21.1	27.5	26.8
Length of pronotum.....		5.2	5.3	5.
Length of tegmen.....		17.5	23.4	20.8

The Isle of Palms male was taken among the dunes of a barrier beach, entirely away from the true salt-marsh habitat, which may account for the small size of the specimen. The specimens from the vicinity of salt pans with *Salicornia* and similar vegetation, a type of situation where the species occurred at Galveston and Corpus Christi, exhibit, as the measurements above show, a somewhat depauperate form when compared with specimens from the salt marsh, which is the typical habitat of the species. Apparently the action of environment is seen in these beach specimens in the reduction of wing length and to a certain degree in the coloration, both of which are similar to the condition found in the allied *O. halophila*, which as far as known invariably frequents the vicinity of salt pans. Tegminal length as a general thing is a somewhat variable factor in *O. olivacea*, the Tybee series showing one female with a body length of 33.3 mm. and a tegminal length of 25, while in this respect almost as much variation either way from the measured specimen is found in the same sex in the Virginia Point series. The general bulk and pronotal length, however, follow the rule laid down above, the influence of a somewhat changed environment on the beaches and flats resulting there in a general size reduction, accompanied by a tegminal abbreviation much as in *O. halophila* which frequents the same habitat.

The range of this species, so far as known, does not extend south of Cedar Keys, Florida, and Corpus Christi, Texas, at the latter locality the species occurring with *O. halophila* (see below), which replaces it southward. Texan *olivacea* are inseparable from eastern coast specimens, and similarly south Florida and south Texas *halophila* are inseparable.

At Wrightsville, Tybee Island, Sandfly and Virginia Point, this species was found in salt marsh, associated with *O. pelidna* at the first two localities, while at Galveston and Corpus Christi it frequented the flats and pans with *Salicornia* and similar vegetation.

**Orphulella halophila** new species. Pl. XII, figs. 6, 7, 8.

1912. *Orphulella pelidna* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 253. (In part.) [Records from Key West, Boot Key and Key Vaca refer in part to *halophila*.]

Allied to *O. olivacea* (Morse), but differing in the more robust form, the never strongly elongate tegmina, the shorter pronotum, the more arcuate lateral carina of the pronotum and more inflated caudal femora.

TYPE: ♀; Key West, Monroe County, Florida. July 3-7, 1912. (Rehn and Hebard.) [Hebard Collection, Type No. 31.]

*Description of Type*.—Size medium; form moderately robust, subcompressed. Head with occiput and interocular region regularly arcuate when seen from the side, width of the interocular space hardly narrower than the greatest fastigial width; fastigium much broader than long (from cephalic margin of eyes), rectangulate in outline, moderately impressed in a rather narrow subarcuate area but little removed from the margin (fig. 7); when seen from the side the fastigio-facial angle is moderately rounded, lateral foveolæ very elongate trigonal, well impressed; facial outline regularly though but moderately oblique; frontal costa narrow at juncture with fastigium, regularly widening ventrad, weakly sulcate dorsad of the median ocellus; eyes one and one-half times as deep as the infra-ocular sulcus is long, subovoid in shape, but moderately prominent when seen from the dorsum; antennæ slightly depressed proximad, faintly tapering distad, considerably shorter than the head and pronotum together. Pronotum with the greatest width across ventral portion of the lateral lobes subequal to the greatest dorsal length of the disk; lateral carinæ moderately converging caudad to the second transverse sulcus, thence diverging caudad, both sections slightly arcuate (fig. 7); cephalic margin of disk subtruncate, caudal margin of disk obtusely arcuate; median carina of pronotum well and evenly elevated, severed by the principal transverse sulcus slightly caudad of the middle. Tegmina just reaching the tips of the caudal femora, apex broadly rounded, when seen from the lateral aspect and in repose the costal margin and the dorsal line of the tegmen subparallel except for the slight proximal lobe; ulnar area completely divided in two by a longitudinal spurious vein and in



consequence with a double series of cells; discoidal area faintly narrowing distad, with irregularly arranged small cells and showing but faint indications of an intercalary vein. Interspace between the mesosternal lobes quadrate, slightly longitudinal; interspace between the metasternal lobes small, narrowed caudad, subcuneate. Caudal femora moderately robust, the greatest depth contained four times in the length; caudal tibiae with eleven spines on the external margin.

*Allotype*: ♂; same data as type. [Hebard Collection.]

*Description of Allotype*.—Differing from the description of the type in the following particulars, aside from the usual sexual differences. Size small. Head with impressed area of the fastigium more extensive caudad; fastigio-facial angle more obtuse-angulate, facial outline when seen from lateral aspect slightly more oblique; frontal costa nearly subequal in width between the antennal bases and the median ocellus, sulcate throughout, but more distinctly so dorsad; eyes nearly twice as deep as the infra-ocular sulcus is long, while prominent still slightly compressed when seen from the dorsum; antennae in length very faintly exceeding that of the head and pronotum together. Pronotum very slightly narrower; lateral carinae subobliterated between the first and second transverse sulci. Tegmina slightly surpassing the tips of the caudal femora; ulnar area with large but irregular cells, without a distinct spurious vein; discoidal area as in female. Interspace between mesosternal lobes distinctly longitudinal; metasternal lobes attingent caudad. Caudal femora with the greatest depth contained three and one-half times in the length; caudal tibiae with eleven spines on the external margin.

The coloration of this species runs through the whole gamut of units or phases found in certain other members of the genus, as *O. pelidna*, showing much greater diversity than in the more closely allied *O. olivacea*. It seems unnecessary to more than summarize the more striking of these units, between all of which there seem to be regular intermediates. The males are much more uniform in their coloration than is the case in the female sex. The green extreme unit has the base color clear dull green-yellow (Ridgway) to chalcidony yellow, running to apple green and even rejane green, the discoidal area of the tegmina with quadrate maculations of fuscous, a distinct postocular suffusion present on head, dorsal portion of lateral lobes and caudo-lateral portions of pronotal disk, the ventral portions of the lateral lobes with or without fuscous linings and hoary tints, the accessory lines on the occiput and femoral bars also



variable in presence or absence and solidarity. The brown extreme is heavily mottled and suffused fuscous on a tawny-olive ground, the dark markings around the lateral carinae of the pronotum strikingly velvety black, the markings of the lateral lobes, tegmina and femora not pronounced. Between these two extremes runs a series of about five phases, each sufficiently distinct to the eye to be readily recognizable. In one the color is uniform honey-yellow with almost no markings, another is similar with the dark markings around the lateral carinae velvety black and a narrow postocular bar fuscous, with faint indications of tegminal maculations and a faint greenish wash on the dorsum of the pronotum. Another has the whole pattern, *i.e.*, femoral markings, linings on lobes and pleura, dark areas about carinae and very weak occipital lines and tegminal maculations, indicated, but also entirely washed with ochraceous-salmon. Another phase, apparently unusual, as it is seen only in males from Point Isabel and a female from Boot Key, has the markings similar, but is unsuffused and the base color is quite pale, in fact light buff. The last of these phases is near the brown extreme, but it has the tegminal markings decided and the base color somewhat paler. In addition there crops out in three of the phases that peculiar washing of all or parts of the tegmina, and occasionally part or all of the pronotum, with rich purple seen in a number of the species of this very variable group. The type belongs to the green extreme and the allotype is of a brownish phase which predominates in the male sex.

Correlating the material by locality for possible color relation to environment is productive of little positive data, as the more extreme color phases are usually from localities represented by uniques or very small series, while the extensive Key West series (thirty-four specimens) shows very great diversity in itself. The pale markings on the lateral carinae of the pronotum, frequently broken mesad, are the most striking constant color feature of the species.

*Measurements (in millimeters).*

♂	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
Key West, Fla., <i>Allotype</i> .....	17.5	3.5	13.4	9.5
Key West, Fla., <i>Paratype</i> .....	18.7	3.7	15.	10.5
Key West, Fla., <i>Paratype</i> .....	19.	3.5	14.2	10.6
Key West, Fla., <i>Paratype</i> .....	18.	3.5	14.4	10.
Corpus Christi, Tex.....	18.8	3.8	15.5	11.2
Corpus Christi, Tex.....	17.5	3.5	15.	11.5
Corpus Christi, Tex.....	18.2	3.5	14.3	11.5

♀	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
Key West, Fla., TYPE.....	24.5	4.7	18.	13.9
Key West, Fla., Paratype.....	24.3	4.5	16.9	12.9
Key West, Fla., Paratype.....	21.5	4.5	17.	13.
Key West, Fla., Paratype.....	25.6	4.8	20.	14.2
Corpus Christi, Tex.....	23.3	4.3	19.2	14.1
Corpus Christi, Tex.....	26.3	5.1	20.7	15.5
Corpus Christi, Tex.....	26.	4.8	20.	15.2

It will be seen from the above measurements that the Texan material has slightly longer femora in both sexes, but the difference is extremely slight. The fastigium varies considerably in the degree of angulation, particularly in the male sex, occasionally being distinctly acute-angulate in that sex, while in the female it sometimes is faintly obtuse-angulate. The lateral carinæ of the pronotum vary much as they do in *O. olivacea*, being more inbowed in some specimens than in others, in fact almost subparallel cephalad in occasional individuals, while very frequently in the males and less frequently in the females they are distinctly subobsolete between the first and second transverse sulcus. The individual variation in tegminal length is less than usual in the present genus.

We have before us a series of seventy-one specimens of this interesting species. The localities represented and data on the material are as follows:

Punta Gorda, Florida, XI, 16, 1911, (W. T. Davis), 1 ♀.	Key West, Fla., I, 20, 1904, (H.); III, 15-16, 1910, (H.); VII, 3-7, 1912, (R. & H.), 12 ♂, 22 ♀, TYPE, <i>allotype</i> and paratypes.
Marco, Fla., IV, 17 and 20, 1912, (W. T. Davis), 1 ♂, 3 ♀.	Corpus Christi, Texas, VII, 29, 1912, (H.), 9 ♂, 12 ♀, 1 juv. ♀.
Key Vaca, Fla., III, 14, 1910, (H.), 1 ♂.	Point Isabel, Tex., VIII, 2, 1912, (H.), 3 ♂.
Boot Key, Fla., III, 14, 1910, (H.), 1 ♂, 1 ♀.	Tampico, Tamaulipas, Mexico, XII, 1906, 1 ♂, 2 ♀, [Hebard Cln.].
Big Pine Key, Fla., VII, 6, 1912, (R. & H.), 1 ♂.	

The above localities show that the range of this species is discontinuous, the two regions in which it occurs being separated by an area, *i.e.*, the greater portion of the Gulf coast of the United States, where *O. olivacea* replaces it in the same environment. We can only speculate as to the centre in which the species originated, but in view of the accumulating evidence bearing on the Mexican origin of certain south Florida Orthoptera it is not at all impossible that this species in the past reached the eastern portion of its present distribution from Mexico, and possibly by way of Yucatan.

It is evident from the data in hand that the species occurs throughout the entire year, material being before us taken every month in the year except February, May, June, September and October.

It seems probable to us that the present species is the one referred to as *O. zapoteca* (Saussure) by Scudder,<sup>46</sup> his specimens having been from Corpus Christi Bay, Texas; Mexico; Venis Mecas, Mexico; San Mateo del Mar, Tehuantepec, Mexico; Guatemala, and Realejo, Nicaragua. Our material runs to this species in his key and the three exact localities given by him with which we are familiar, or can locate, are in the maritime region frequented by this species. The use of Saussure's name, however, does not appear warranted, as, while the description is brief, it appears to apply more satisfactorily to one of the peculiarly Mexican forms of the genus.

The habitats frequented by the species were all quite similar; at Key West individuals being common in *Salicornia* and other halophytes growing on almost bare coral rock in the mangrove region at the east end of the island, on Big Pine Key the species was taken among mangroves, while on Key Vaca and Boot Key it occurred under much the same conditions as at Key West. At Corpus Christi and Point Isabel the species frequented saline adobe flats with low halophytic vegetation.

***Orphulella speciosa* (Scudder).**

Glen Echo, Maryland, VII, 10, 1914, (H.), 2 ♂, 2 ♀.

District of Columbia, VIII, 11, 1883, 1 ♂, [Hebard Cln.].

Fredericksburg, Virginia., VII, 20, 1913, (R. & H.), 18 ♂, 31 ♀.

At Fredericksburg this northern type was fairly abundant and widely distributed, especially in short grasses on the uplands bordering the valley of the Rappahannock. These are portions of the rounded escarpment of the Piedmont region, and it seems probable that in Virginia this species does not occur on the coastal plain. The present form is more distinctly a species of short-grass areas than *O. pelidna*.

***Dichromorpha viridis* (Scudder).**

*Virginia.*

Arlington, VII, 9, 1914, (H.), 2 juv. ♂.

Fredericksburg, VII, 20, 1913, (R. & H.), 9 ♂, 8 ♀.

Orange, VII, 21, 1913, (R. & H.), 2 ♂, 3 ♀, 1 juv. ♀.

Petersburg, VII, 23, 1913, (R. & H.), 4 ♂, 3 ♀, 1 juv. ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 2 ♂, 1 ♀.

Goldsboro, VII, 25, 1913, (R. & H.), 2 ♂, 1 ♀, 1 juv. ♂, 3 juv. ♀.

Fayetteville, IX, 9, 1911, (R. & H.), 4 ♂, 3 ♀.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 3 ♂, 3 ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 2 ♂.

Manning, V, 23 and 30, 1914, (W. Stone), 1 juv. ♂, 1 juv. ♀, [A. N. S. P.].

<sup>46</sup> *Can. Ent.*, XXXI, p. 180, (1899).

Yemassee, IX, 4, 1911, (R. & H.),  
2 ♂, 3 ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.),  
2 ♂, 1 ♀, 1 juv. ♀.

Macon, VII, 30-31, 1913, (R. & H.),  
4 ♂.

Columbus, VII, 16, 1913, 1 ♂, [Ga.  
State Cln.].

Oglethorpe, Macon County, VII, 1  
and 31, 1910, (J. C. Bradley), 1 ♂,  
1 ♀.

Albany, VIII, 1, 1913, (R. & H.), 5 ♀,  
1 juv. ♀.

Tifton, IX, 8, 1910, (J. C. Bradley),  
1 ♂.

Spring Creek, VIII, 26-28, 1913,  
(J. C. Bradley), 1 ♀.

Bainbridge, V, 31-VI, 1, 1911; VII,  
15, 1912; IX, 17-X, 19, 1910, (J. C.  
Bradley), 3 ♂, 6 ♀.

Homerville, VIII, 27, 1911, (R. & H.),  
2 ♂, 4 ♀.

Billy's Island, VI-VII, 1912; IX, 1-5,  
XII, 20, 1913, (J. C. Bradley), 8 ♂,  
10 ♀, 1 juv. ♀.

Jordan's, Billy's Island, VIII, 31, 1913,  
(J. C. Bradley), 1 ♂.

Jesup, IX, 1, 1911, (R. & H.), 4 ♂,  
5 ♀; XII, (H.), 1 ♀.

Brunswick, VIII, 30, 1911, (H.), 1 ♀.

St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 1 ♀; IX-X, 1910, 1 ♂,  
1 ♀, [Ga. State Cln.].

Cumberland Island, VIII, 31, 1911,  
(R. & H.), 4 ♂, 2 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
1 ♀; VIII, 1885, (W. H. Ashmead),

10 ♂, 8 ♀, [Hebard Cln.]; XI, 5,  
1911, (W. T. Davis), 1 ♂, 2 ♀.

South Jacksonville, IX, 7, 1913,  
(W. T. Davis), 1 ♂, 2 ♀.

Ortega, Duval County, IX, 6, 1913,  
(W. T. Davis), 1 ♂.

Atlantic Beach, VIII, 24-25, 1911,  
(R. & H.), 8 ♂, 12 ♀.

Pablo Beach, IX, 5 and 27, 1913,  
(W. T. Davis), 5 ♂, 7 ♀.

Live Oak, VII, 26, 1911, (R. & H.),  
3 ♂.

An examination of the above series and material from the north-eastern States shows that as a rule the fastigium is blunter in the more southern specimens, particularly in the female sex. Occasional individuals from Georgia localities have the angle of this same region similar to that found in Pennsylvania and New Jersey specimens, but by far the majority show a distinct broadening of the fastigium. The size varies individually in any considerable series and there appears to be no geographic tendency in this feature.

There is a slight preponderance of the green phase, while the brown individuals show a maculate, a simply punctulate and a plain form. The green phase males show a decided amount of variation in the infuscation of the lateral aspect, this being almost blackish in certain specimens (Oglethorpe, Billy's Island, Pablo Beach and Atlantic Beach), paling until, in two Lake Waccamaw males, there is no infuscation except the carinal lines and their tegminal continuations.

In the present series no specimens are macropterous, the tegmina falling short of the apex of the abdomen in all.

The species is a lover of weedy spots, grassy fields and damp overgrown depressions, occurring frequently in abundance. It is occasionally found in grasses in pine woods (Weldon, Goldsboro and Jacksonville).

*Clinocephalus elegans* Morse.

1905. *Clinocephalus pulcher* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 36. [Miami, Florida.]

*Maryland.*

Piney Point, VIII, 12, 1880, 1 ♀,  
[Hebard Cln.].

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.),  
11 ♂, 3 ♀.

Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 11 ♂, 7 ♀, 1 juv. ♀.

Wilmington, IX, 8, 1911, (R. & H.),  
11 ♂, 5 ♀.

Winter Park, IX, 7, 1911, (R. & H.),  
27 ♂, 30 ♀.

Wrightsville, IX, 7, 1911, (R. & H.),  
3 ♂, 7 ♀.

*South Carolina.*

Ashley Junction, VIII, 15, 1913, (R.),  
3 ♂, 2 juv. ♀.

Yemassee, IX, 4, 1911, (R. & H.),  
23 ♂, 35 ♀.

*Georgia.*

Tybee Island, IX, 2, 1911, (R. & H.),  
9 ♂, 9 ♀.

Sandfly, IX, 3, 1911, (R. & H.), 11 ♂,  
5 ♀.

Brunswick, VIII, 30, 1911, (H.), 1 ♂,  
1 ♀.

Cumberland Island, VIII, 31, 1911,  
(R. & H.), 1 juv. ♀.

Jesup, IX, 1, 1911, (R. & H.), 21 ♂,  
9 ♀.

Billy's Island, VII, 1912; IX, 1-5,  
1913, (J. C. Bradley), 2 ♀, 2 juv. ♀.

Suwannee Creek, VIII, 28, 1911, (R. &  
H.), 2 ♂, 2 ♀.

Hebardville, VIII, 28, 1911, (H.), 1 ♀.

Homerville, VIII, 27, 1911, (R. & H.),  
22 ♂, 7 ♀, 1 juv. ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
2 ♂, 2 ♀.

South Jacksonville, IX, 7, 1913, (W. T.  
Davis), 3 ♂, 1 ♀.

Atlantic Beach, VIII, 24-25, 1911,  
(R. & H.), 12 ♂, 12 ♀, 1 juv. ♀.

*Texas.*

Webster, Harris County, VII, 19, 1912,  
(H.), 2 ♂.

Dickinson, Galveston County, VII,  
20, 1912, (H.), 3 ♂.

A critical examination of this material shows that in the southern part of its range the species varies away from the more northern type, much as do *Orphulella olivacea* and *Chortophaga viridifasciata*, the general size, as a rule, increasing southward and the fastigium there becoming appreciably broader and blunter. Material from Miami, Florida, has been separated from true *elegans* by the authors, who first considered it to represent a full species, *Clinocephalus pulcher*, and later regarded it as a geographic race of *elegans*.<sup>47</sup> Specimens from as far north as St. Simon's Island, Georgia, were considered representative of *pulcher*, the characters of which were also analyzed on the basis of Florida material.<sup>48</sup> In the light of the additional collections now available, it seems best to place this name unreservedly in synonymy. The characters are not decided or constant enough in our opinion to justify the retention of the name, the recognition of a geographic race requiring, it appears to us, more uniformity in, and more significance to, its differential characters over at least the greater portion of its range. The gradual increase in size and the broadening and blunting of the fastigium

<sup>47</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 588, (1911).

<sup>48</sup> *Ibid.*, 1907, p. 287, (1907).



southward are features shared by a number of species, which differences, uncorrelated with other characters, we do not feel are sufficiently clear cut to constitute racial criteria, the two extremes in this case grading gradually into one another instead of showing uniformity over definite areas and intergradation over relatively smaller ones.

The previous analysis of the characters of *pulcher* covered the supposedly diagnostic features, *i.e.*, size, tegminal length, fastigial form, frontal costa and color. A re-examination of these features shows that the general size as a rule follows the usual increase in size southward, but that in the series from Lake Waccamaw, Winter Park, Yemassee, Jesup, Tybee Island and Sandfly we find individuals of both sexes which are similar in this respect to New Jersey, and others to southern Florida, specimens. Regarding the relative length of the tegmina, we find no specimens in the present material with tegmina as long as south Florida representatives, but each series shows a considerable degree of individual variation in this respect in both sexes. The four females from Jacksonville all have the tegmina very short, not surpassing the middle of the third abdominal segment, lanceolate and acute. The form of the fastigium shows a general uniform broadening southward, but, like the length measurement, occasional individuals of both sexes have it as narrow and as much angulate as in New Jersey specimens. The sulcation of the frontal costa varies greatly in degree, to a certain extent geographically, but to a greater one individually.

As we have said before, the more southern specimens exhibit color patterns not observed in more northern individuals. This statement holds true in the light of the present material, the extreme trilineate form being suggested in but a few individuals, these from southern Georgia, although blackish or largely blackish specimens are present in the Wilmington, Lake Waccamaw, Yemassee, Sandfly, Homer-ville, Jacksonville and Atlantic Beach series. These blackish specimens are females and without exception they were taken on wet black ground in swampy situations.

The Texas specimens are inseparable from Georgia individuals and the range of the species is considerably extended by these records. In the southern States the species is found at greater distances from the coast line than is the case to the northward, but nowhere has the species been found above the fall line; Fayetteville, North Carolina, being the farthest inland locality from which it is known. The range extends from western Long Island, New York



(Ravenswood), south to Key West, Florida, west to eastern Texas (Webster and Dickinson), extending inland as far as Fayetteville, North Carolina, Homerville, Georgia, and Flomaton, Alabama.

The species always occurs in moist areas, and in the region here treated often in woodland, generally among bracken, reeds or grasses, but occasionally on black water-soaked ground covered with low swamp plants. The vicinity of a wet depression or the tangled border of a swampy tract of pine or cypress is particularly frequented.

***Chlœaltis conspersa* Harris.**

Glen Echo, Maryland, VII, 10, 1914, (H.; luxuriant grasses and other vegetation on hill slopes covered with low scattered pines), 6 ♂, 6 ♀.      Arlington, Virginia, VII, 9, 1914, (H.; area of *Andropogon* and other grasses), 1 ♂, 1 ♀.

The present records extend considerably the known range of this northern species southward near the Atlantic Coast; in the Appalachians it is found at high elevations as far south as North Carolina. The series here considered is composed of large individuals and the females are all of the normal condition with greatly reduced tegmina and wings.

***Arphia xanthoptera* (Burmeister).**

*District of Columbia.*

Washington, IX, 23, 1883, 1 ♀, [Hebard Cln.].

*Virginia.*

Orange, VII, 21, 1913, (R. & H.), 2 juv. ♂.  
Lynchburg, VII, 22, 1913, (R. & H.), 1 juv. ♀.  
Petersburg, VII, 23, 1913, (R. & H.), 3 juv. ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 2 juv. ♂, 1 ♀.  
Greensboro, VII, 26, 1913, (R. & H.), 1 juv. ♂.  
Charlotte, VII, 27, 1913, (R. & H.), 1 ♂, 1 juv. ♂, 1 juv. ♀.  
Goldsboro, VII, 25, 1913, (R. & H.), 1 juv. ♂.  
Fayetteville, IX, 9, 1911, (R. & H.), 2 ♂.  
Wilmington, IX, 8, 1911, (R. & H.), 1 ♂, 2 ♀.  
Winter Park, IX, 7, 1911, (R. & H.), 5 ♂, 3 ♀.  
Wrightsville, IX, 7, 1911, (R. & H.), 2 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 5 ♂, 2 ♀.  
Columbia, VII, 28, 1913, (R. & H.), 3 ♂, 1 juv. ♀.

Ashley Junction, VIII, 15, 1913, (R.), 1 ♂.  
Yemassee, IX, 4, 1911, (R. & H.), 4 ♂, 5 ♀.

*Georgia.*

Jasper, 1,550 feet, VIII, 5, 1913, (R.), 2 juv. ♂.  
Toccoa, VIII, 4-5, 1913, (H.), 2 juv. ♂, 1 juv. ♀.  
Currahee Mountain, VIII, 5, 1913, (H.), 2 juv. ♀.  
Thompson's Mills, X, 1909, (H. A. Allard), 2 ♂, [U. S. N. M.].  
Buckhead, VIII, 2, 1913, (R. & H.), 1 juv. ♀.  
Stone Mountain, VIII, 3, 1913, (R. & H.), 1 ♂; IX, 12, 1913, (J. C. Bradley), 1 ♀.  
Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.  
Augusta, VII, 29, 1913, (R. & H.), 4 ♂, 4 juv. ♂, 3 juv. ♀.  
Macon, VII, 30-31, 1913, (R. & H.), 2 ♂, 1 juv. ♂, 2 juv. ♀.  
Warm Springs, VIII, 9-10, 1913, (R.), 1 ♂, 1 ♀, 1 juv. ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.), 4 ♂.  
Jesup, IX, 1, 1911, (R. & H.), 2 ♂, 3 ♀; XII, 1908, (H.), 1 ♀, 1 juv. ♂.  
Brunswick, VIII, 30, 1911, (H.), 3 ♂.

Cumberland Island, VIII, 31, 1911,  
(R. & H.), 1 ♀.  
Albany, VIII, 1, 1913, (R. & H.),  
1 ♂, 1 ♀.  
Bainbridge, IX, 3-7, 1910, (J. C.  
Bradley), 1 ♂.  
Spring Creek, VI, VII, 1911-12,  
(J. C. Bradley), 1 ♂, 1 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. &  
H.), 4 ♂, 5 ♀.  
Atlantic Beach, VIII, 24-25, 1911,  
(R. & H.), 2 ♂.  
Live Oak, VIII, 26, 1911, (R. & H.),  
1 ♀.

Scarcely any size variation is apparent over the distribution of the present species. Males in the series before us range in length from 21.5 to 27 mm., females from 31.5 to 40 mm. Several specimens from southern Georgia show a considerable reduction in the pronotal crest, which might confuse them with *A. granulata*, were other differential characters, which separate these two distinct species, not carefully observed. The height of this crest, measured vertically from the dorso-caudal angle of the pronotum, is variable in all of the series now under consideration, extremes measuring as follows: males, 2 to 2.7 mm., females, 2.3 to 3.4 mm. The great majority of specimens approach more closely the maximum in this measurement.

The specimens of palest coloration have the ventral surface of the body very dark, which portion of the body is almost black in the normal type of this insect; in *A. granulata*, this surface is normally very pale, only occasionally weakly suffused with brown.

The present species was found in dry situations, particularly in more open woodlands (long-leaf and short-leaf pine, pine and oak or only deciduous trees), in fields along the edge of forests and occasionally in grassy fields; on Stone Mountain, Georgia, a single specimen was found on the bare granite rock surface at the summit.

South of northern Florida, the species is known from but one record, Orange City Junction, Florida.

***Arphia granulata* Saussure.**

*South Carolina.*

Sumter, V, 30, 1914, (W. Stone), 2 ♂,  
[A. N. S. P.].  
Manning, V, 28, 1914, (W. Stone), 1 ♂,  
[A. N. S. P.].

*Georgia.*

St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 6 ♂, 5 ♀.  
Brunswick, VIII, 30, 1911, (H.), 2 ♂,  
3 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 2 ♂, 2 ♀.  
Hebardville, V, 15, 1915, (H.), 5 ♂,  
3 ♀; VIII, 28, 1911, (H.), 2 ♀.

Homerville, VIII, 27, 1911, (R. & H.)

1 ♂, 1 ♀.

Mixon's Hammock, Okefenokee  
Swamp, V, 16, 1915, (H.), 1 ♂.

Billy's Island, VI, IX, 1-5, 1912-13.  
(J. C. Bradley), 7 ♂, 5 ♀, 1 juv. ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
1 ♂; (T. J. Priddey), 8 ♂, 2 ♀,  
[Hebard Cln.].

Atlantic Beach, VIII, 25, 1911, (R. &  
H.), 3 ♀.

Ortega, IX, 6, 1913, (W. T. Davis), 1 ♂.

Indian River, (T. J. Priddey), 1 ♂,  
[Hebard Cln.].

In the present species the height of the pronotal crest, measured vertically from the dorso-caudal angle of the pronotum, is moderately variable in all of the material in our collections, the extremes measuring as follows; males 1.4–2 mm., females 1.5–2 mm. The minimum of this measurement is approached by the majority of specimens.

The present species is widely distributed through the pine woods of Florida and extreme southern Georgia and is an inhabitant of low, flat country. On Mixon's Hammock a specimen was taken on the edge of an oak grove. The insect is known from localities extending from Wilmington, North Carolina, and Waynesville, Georgia, westward as far as Thomasville, Georgia, and south to Key West, Florida.

***Arphia sulphurea* (Fabricius).**

*Maryland.*

Chesapeake Beach, 1 ♂, [Davis Cln.].  
Glen Echo, VII, 10, 1914, (H.), 1 ♂, 1 ♀.  
Washington, D. C., VIII, 1883, 2 ♂,  
[Hebard Cln.].

*Virginia.*

Great Falls, VI, 26, 1914, (W. T. Davis), 1 ♀.  
Fredericksburg, VII, 20, 1913, (R. & H.), 1 ♀, 1 juv. ♂.  
Orange, VII, 21, 1913, (R. & H.), 1 ♀, 1 juv. ♀.  
Lynchburg, VII, 22, 1913, (R. & H.), 1 ♀.

*North Carolina.*

Manteo, V and VI, 1903, 1 ♂, 1 ♀, [Davis Cln.].  
Weldon, IV, 20, 1908, (B. Long), 1 ♂, [A. N. S. P.]; VII, 24, 1913, (R. & H.), 1 ♀.  
Greensboro, VII, 26, 1913, (R. & H.), 2 juv. ♀.

Charlotte, VII, 27, 1913, (R. & H.), 1 ♀.

Lake Toxaway, V, (Mrs. A. T. Slosson), 1 ♀, [Davis Cln.].

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 juv. ♀.

*Georgia.*

Clayton, 2,000 feet, V, 18–26, 1911, (J. C. Bradley), 2 ♂; VI, VII, 1909–10, (W. T. Davis), 3 ♂, 5 ♀.  
Pinnacle Peak, VII, 21, 1910, (W. T. Davis), 1 ♂.  
Black Rock Mountain, 3,500 feet, V, 20–25, 1911, (J. C. Bradley), 1 ♂.  
Tuckoluge Creek, Rabun County, VII, 1910, (W. T. Davis), 1 ♂.  
Jasper, 1,550 feet, VIII, 5, 1913, (R.), 1 ♂.  
Currahee Mountain, 1,700 feet, VIII, 5, 1913 (H.), 1 ♀.  
Macon, VII, 30–31, 1913, (R. & H.), 2 ♂.

Mature individuals of the present insect appear in the early spring, while the above records show that desultory adults are still present as late as early August.

The most southern definite record for the species is Leon County, Florida, near the Georgia State line.

***Chortophaga viridifasciata* (De Geer).**

*Maryland.*

Glen Echo, VII, 10, 1914, (H.), 1 ♂.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 2 ♂, 2 ♀, 2 juv. ♂, 2 juv. ♀.  
Orange, VII, 21, 1913, (R. & H.), 1 ♂.

Lynchburg, VII, 22, 1913, (R. & H.), 1 ♂, 1 juv. ♂, 1 juv. ♀.

Montgomery County, 4 ♀, [Hebard Cln.].

Petersburg, VII, 23, 1913, (R. & H.), 2 ♂, 1 ♀.

*North Carolina.*

- Weldon, VII, 24, 1913, (R. & H.),  
1 ♂, 1 ♀, 1 juv. ♂.  
Greensboro, VII, 26, 1911, (R. & H.),  
1 ♀, 1 juv. ♂, 1 juv. ♀.  
Charlotte, VII, 27, 1913, (R. & H.),  
1 juv. ♀.  
Fayetteville, IX, 9, 1911, (R. & H.),  
1 ♂, 1 ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
1 ♂.

*South Carolina.*

- Florence, IX, 6, 1911, (R. & H.),  
1 ♂, 1 ♀.  
Sullivan Island, IX, 5, 1911, (R. & H.),  
1 ♂.

*Georgia.*

- Clayton, 2,000 feet, V, 18-26, 1911,  
(J. C. Bradley), 2 ♂; VI, 1909,  
(W. T. Davis), 5 ♂, 4 ♀.  
Pinnacle Peak, VIII, 20, 1913, (J. C.  
Bradley), 2 ♂.  
Black Rock Mountain, 3,000 and 3,500  
feet, V, 20-25, 1911, (J. C. Bradley),  
1 ♂, 1 ♀.

- Tuckoluge Creek, Rabun County, VII,  
1910, (W. T. Davis), 3 ♀.  
Jasper, 1,550 feet, VIII, 5, 1913, (R.),  
1 ♂.  
Toccoa, 1,094 feet, VIII, 4, 1913, (H.),  
1 ♀.  
Currahee Mountain, VIII, 5, 1913,  
(H.), 1 ♂.  
Thompson's Mills, spring 1909, (Al-  
lard), 1 ♂, 1 ♀, [U. S. N. M.].  
Rome, VIII, 21, 1910, 1 ♂, 1 ♀,  
[Ga. State Cln.].  
Buckhead, VIII, 2, 1913, (R. & H.),  
1 ♂, 2 ♀, 2 juv. ♂.  
Stone Mountain, 1,600 feet, VIII, 3,  
1913, (R. & H.), 2 ♀.  
Vicinity of Stone Mountain, VIII, 3,  
1913, (R. & H.), 1 ♂, 1 ♀.  
Gainesville, IV, 12, 1911, (J. C. Brad-  
ley), 1 ♀.  
Augusta, VII, 29, 1913, (R. & H.),  
3 ♂, 7 ♀, 2 juv. ♂.  
Macon, VII, 30-31, 1913, (R. & H.),  
3 ♂, 8 ♀, 1 juv. ♀.

In the series before us a perceptible increase in robustness is found southward in the distribution at low elevations of the present species; this is accompanied by an appreciable reduction in the pronotal crest and a moderate broadening of the vertex. Material from altitudes of 3,000 feet or over in the mountains of North Carolina and Georgia is quite similar to material from Massachusetts, but the pair before us from elevations of 3,000 and 3,500 feet on Black Rock Mountain, Georgia, are very large, more attenuate, with higher crest and more compressed vertex, the dorsal surface of which is excavate.

Although material of the present species from the country adjacent to that in which *C. australior* is found shows certain characters more like those found in that species, no intergradation whatever exists, and *C. australior* shows definitely a more recent common ancestry with *C. cubensis*, as has already been observed. The southeastern limits of the present insect's distribution define sharply the north-western limits of the range of *C. australior*, which throughout its range appears to wholly supplant *C. viridifasciata*.

Male immature examples in the earliest instars have the subgenital plate scoop-shaped, in the larger young this plate is much as in the adult condition. In the above series there are very small young from Lynchburg, Virginia; Greensboro and Charlotte, North Carolina, and Augusta, Georgia, which afford decided evidence that the insect

is particularly a spring species over the entire portion of its range treated in the present paper, as adults are usually found to be scarce as early as the middle of July. At about this time the young were found quite numerous in Virginia and North Carolina.

We have never seen specimens of the present insect showing any indication of a reddish suffusion, which is so striking in occasional specimens, particularly those in the green phase, of *C. australior*. In the present series eighteen males and nine females are of the brown phase, seven males and twenty-two females are of the green phase, while one female is brown suffused with green.

This species prefers upland surroundings where it thrives in the open in areas of short grasses; it is also found along the borders of woodlands (Weldon and Greensboro, North Carolina; Jasper, Georgia) and was found scarce in bunch-grass growing on granite slopes (Stone Mountain, Georgia).

On the Atlantic coast the insect is known as far south as Sullivan Island, South Carolina, inland the most southern records are Florence, South Carolina; Augusta, Marshallville and West Point, Georgia, and Flomaton, Alabama.<sup>49</sup> The species is found far south of this latitude in Texas, and we have specimens before us from as far east on the Gulf coast as Biloxi, Mississippi.

**Chortophaga australior** Rehn and Hebard.

*Georgia.*

Savannah, (A. Oemler), 1 ♂, [U. S. N. M.].  
 Tybee Island, VII, 26, 1913, (J. C. Bradley), 1 ♂, 1 ♀; IX, 2, 1911, (H.), 1 ♂.  
 Jesup, IX, 1, 1911, (R. & H.), 2 ♀.  
 St. Simon's Island, VIII, 30, 1911, (R. & H.), 3 ♂, 9 ♀, 1 juv. ♂.  
 Brunswick, VIII, 30, 1911, (H.), 1 ♂, 1 ♀.  
 Cumberland Island, IV, 29, 1 ♀, [Ga. State Cln.]; VIII, 31, 1911, (R. & H.), 1 ♂, 4 ♀.  
 Hebardville, V, 15, 1915, (H.), 1 ♂.  
 Billy's Island, VI, VII, IX, 1912-13, (J. C. Bradley), 8 ♂, 6 ♀.  
 Homerville, VIII, 27, 1911, (R. & H.), 1 ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀.  
 Tifton, IX, 8, 1910, (J. C. Bradley), 1 ♂, 1 ♀.  
 Bainbridge, IX, 3-X, 19, 1910, (J. C. Bradley), 3 ♂, 6 ♀.

Spring Creek, VI, 7-VIII, 28, 1911, 13, (J. C. Bradley), 8 ♂, 6 ♀.

*Florida.*

Fernandina, (Fenn), 1 ♂, [U. S. N. M.].  
 Jacksonville, VIII, 25, 1911, (R. & H.), 1 ♀, 1 juv. ♂; IX, 7, 1913, (W. T. Davis), 1 ♂; XI, 5, 1911, (W. T. Davis), 2 ♂, 5 ♀.  
 Atlantic Beach, VIII, 24-25, 1911, (R. & H.), 5 ♂, 12 ♀, 1 juv. ♀.  
 Pablo Beach, IX, 5, 27, 1913, (W. T. Davis), 3 ♂, 4 ♀.  
 Live Oak, VIII, 26, 1911, (R. & H.), 3 ♀.  
 St. Vincent Island, XI, 1, 1910, (W. L. McAtee), 2 ♂, 1 ♀, [U. S. N. M.].  
 St. Augustine, XI, 8, 1911, (G. P. Englehardt), 1 ♀, [B. I.].  
 Cedar Keys, VI, 9, 1 ♀, [U. S. N. M.].  
 Sanford, III, (A. N. Caudell), 1 ♀, [U. S. N. M.].  
 Indian River, 1896, (T. J. Priddey), 1 ♂, 1 ♀, [Hebard Cln.].

<sup>49</sup> See under *C. australior*, Morse's records of this insect which apply properly to that species.

Scarcely any geographic variation is found in the present species, individuals from southern Florida are, however, as a rule slightly more robust than those from Georgia.

In the above series two males and eight females have a more or less decided reddish suffusion on the dorsal surface of head, pronotum and caudal femora. The series contains twenty-three males and eleven females in the brown phase, and six males and twenty-eight females in the green phase. As is true in *C. viridifasciata*, the majority of males are of the former color phase, while the majority of females are of the latter, a very much greater diversity in tone and intensity of shade and marking is, however, found in the present insect.

The species is found abundant in colonies in very short grass of fields, along roads and in uncultivated spots in and about towns. When one specimen is flushed often a dozen or twenty will fly up, then frequently others will not be seen for many yards. The flight of this species is swift and is accompanied by quite a loud buzzing sound. In sandy fields overgrown with short grasses on St. Simon's Island, Georgia, and at Atlantic Beach, Florida, the insects were present in great numbers. The species is known to be present in the adult condition throughout the year over its entire range.

The distribution of the present insect ranges from the Dry Tortugas, Florida, northward to Savannah, Georgia, the most north-western localities at which it has been found being Tifton, Albany and Spring Creek, Georgia, and Ft. Barrancas, Florida.<sup>50</sup>

***Encoptolophus sordidus* (Burmeister).**

*District of Columbia.*

Washington, IX, 1883, 1 ♂, [Hebard Cln.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 1 juv. ♀.

Orange, VII, 21, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.), colony of very small young found.

Charlotte, VII, 27, 1913, (R. & H.), 1 juv. ♀.

A very few immature examples are all the specimens of the present species which were found by the authors in the southern Piedmont region in late July; Morse secured but few examples of this insect when working in this region in late August and early September. Charlotte, North Carolina, is the most southern record for the present insect, which is very scarce over all but the most northern portion of

<sup>50</sup> Morse's records of *C. viridifasciata* from Savannah, Tybee Island and Waycross, Georgia, and Carrabelle, Warrington and Fort Barrancas, Florida, are properly referable to the present species.



the territory at present under consideration. The distribution of the present species is known to extend westward to the Great Plains in the latitude of Nebraska; south of this the most western records are eastern Kentucky and Roan Mountain Station, Tennessee. Scudder's Florida record is based upon a misidentification of *C. australior*. Saussure's records for Georgia and Florida likewise cannot be credited to this species, while Coquillett's Californian record applies to a western species.

**Pardalophora**<sup>51</sup> **phœnicoptera** (Burmeister).

1892. *Hippiscus* (*Hippiscus*) *texanus* Scudder, Psyche, VI, pp. 267, 286. [Dallas and San Antonio, Texas.]

*Maryland.*

Queen Anne County, VIII, 15, 1902, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 6 ♂, 2 ♀.

Orange, VII, 21, 1913, (R. & H.), 1 ♂.

Lynchburg, VII, 22, 1913, (R. & H.), 1 ♂.

Petersburg, VII, 23, 1913, (R. & H.), 2 ♂.

Suffolk, (C. W. Johnson), 1 ♀, [A. N. S. P.].

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 3 ♂, 3 ♀.

Hertford County, VI, 9, 1895, 1 ♂ [A. N. S. P.].

Charlotte, VII, 27, 1913, (R. & H.), 1 ♂.

Goldsboro, VII, 25, 1913, (R. & H.), 1 ♂.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.), 2 ♂.

Manning, V, 30, 1914, (W. Stone), 6 ♂, [A. N. S. P.].

*Georgia.*

Clayton, VI, 1909, (W. T. Davis), 4 ♂, 2 ♀.

Black Rock Mountain, V, 20-25, 1911, (J. C. Bradley), 1 juv. ♀.

Toccoa, VIII, 4-5, 1913, (H.), 2 ♂.

Currahee Mountain, VIII, 5, 1913, (H.), 1 ♀.

Sharp Mountain, VIII, 6, 1913, (R.), 1 ♀.

Buckhead, VIII, 2, 1913, (R. & H.), 1 ♀.

Stone Mountain, VIII, 3, 1913, (R. & H.), 1 ♀.

Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 2 ♀.

Augusta, VII, 29, 1913, (R. & H.), 2 ♂, 1 ♀.

Warm Springs, VII, 18, 1913, (J. C. Bradley), 1 ♀; VIII, 9-10, 1913, (R.), 1 ♂.

Groveland, VII, 28, 1913, (J. C. Bradley), 1 ♀.

Cumberland Island, IV, 29, 1911, 1 ♂, [Ga. State Cln.].

Hebardville, V, 15, 1915, (H.), 3 ♂, 3 ♀, 1 juv. ♀.

Billy's Island, IV, 1912, (J. C. Bradley), 1 ♂, 1 ♀.

Bainbridge, V, 30-VI, 1, 1911, (J. C. Bradley), 1 ♀.

Spring Creek, VI, 7-VII, 29, 1911, (J. C. Bradley), 5 ♂, 2 ♀.

*Florida.*

Jacksonville, V, 1885, (W. H. Ashmead), 2 ♀; (T. J. Priddey), 4 ♂,

4 ♀, [all Hebard Cln.].

Enterprise, IV, 24, 1903, 1 juv. ♀, [U. S. N. M.].

An examination of the material upon which Scudder based his *H. texanus* shows that name to be an absolute synonym of the present species. In Scudder's key that portion which separates these two

<sup>51</sup> In the resurrection of this name we follow Kirby, *Synon. Catal. Orth.*, III, p. 206, (1910). This genus offers more important characters to separate it from true *Hippiscus* than is the case with numerous other recognized *Ædipodine* genera.

( $e^1$  and  $e^2$ ) is diagnostically worthless; such variation as is noted in tegminal markings is found everywhere in the eastern series before us which belong unquestionably to the same species; it is impossible to separate Scudder's series of *texanus* from the present insect by means of tegminal contour, while the "sharp" and "not very sharp" lateral carinae of the pronotum are intangible. The  $g^2$  portion of the key serves fully as well to separate *phœnicopterus* from *haldemani*.

Scarcely any geographic variation in size is found in the present species over that portion of its range here considered; however, material from the low-land portions of Georgia, from Florida and Texas, shows a somewhat greater robustness of the caudal femora accompanied by an appreciable increase in the lamellation of the ventral margins of the same. The tegminal length in the present series is variable irrespective of geographic distribution, extremes of the present series measure as follows; males 27.5–32 mm., females 33–43 mm. The specimens from Texas are as large as the largest specimens here recorded and have tegmina which, in the majority of such specimens before us, very slightly exceed in length the maximum in the present series.

In the present series are five males and two females with head, pronotum and caudal femora greenish. Specimens from the low-land of Georgia and from Florida are somewhat more brilliantly colored and show a greater diversity of coloration than do those which compose the remainder of the series; among these are several females and one male with head, pronotum and caudal femora paler than usual and almost immaculate, while the tegminal markings are considerably reduced in number. A female from Augusta, Georgia, is nearly immaculate, but darker in coloration than these specimens.

The present insect appears adult in the early spring, and by the first of August few survivors remain. South of the northern portion of Florida the species is known from but four specimens, two males captured at Lakeland, a female from Cleveland and an immature female from Southside, Miami.<sup>52</sup>

**Hippiscus rugosus** (Scudder).

1892. *Hippiscus* (*Hippiscus*) *compactus* Scudder, Psyche, VI, pp. 268, 288. [Carolina; south shore of north Potomac, Maryland.]

1892. *Hippiscus* (*Hippiscus*) *variegatus* Scudder, Psyche, VI, pp. 268, 301. [Pennsylvania; Maryland; Washington, D. C.; Georgia; Indiana; southern Illinois; Topeka, Kansas.]

<sup>52</sup> These specimens show a maximum development of the robustness of the caudal femora and the increase in the lamellation of the ventral margins of the same.

1892. *Hippiscus* (*Hippiscus*) *suturalis* Scudder, Psyche, VI, pp. 268, 301. [Moline, Illinois.]

1901. *Hippiscus citrinus* Scudder, Can. Ent., XXXIII, p. 88. [Alabama.]

1906. *Hippiscus immaculatus* Morse, Psyche, XIII, p. 119. [Clarendon, Texas.]

#### Maryland.

Marshall Hall, VIII, 9, 1883, 1 ♀, [Hebard Cln.].

Washington, D. C., VIII, 1883, 1 ♀, [Hebard Cln.].

#### Virginia.

Arlington, VII, 9, 1914, (H.), 1 juv. ♂.

Fredericksburg, VII, 20, 1913, (R. & H.), 12 ♂, 4 juv. ♂, 3 juv. ♀.

Orange, VII, 21, 1914, (R. & H.), 1 ♂.

Lynchburg, VII, 22, 1913, (R. & H.), 1 ♂, 1 juv. ♀.

#### North Carolina.

Weldon, VII, 24, 1913, (R. & H.), 3 ♂, 4 ♀.

Wilmington, IX, 8, 1911, (R. & H.), 1 ♂, 2 ♀.

Winter Park, IX, 7, 1911, (R. & H.), 6 ♂, 10 ♀.

#### South Carolina.

Columbia, VII, 28, 1913, (R. & H.), 6 ♂.

#### Georgia.

Thompson's Mills, X, 1909, (H. A. Allard), 3 ♂, 1 ♀, [U. S. N. M.].

Toccoa, VIII, 4-5, 1913, (H.), 2 juv. ♀. Buckhead, VIII, 2, 1913, (R. & H.), juv. numerous.

Stone Mountain, VIII, 3, 1913, (R. & H.), 1 juv. ♂.

Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 1 ♂.

Augusta, VII, 29, 1913, (R. & H.), 1 ♀, 1 juv. ♀.

Macon, VII, 30-31, 1913, (R. & H.), 1 ♂, 1 ♀, 3 juv. ♂.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂, 1 ♀.

Bainbridge, VII, 15-27, 1909, (J. C. Bradley), 4 ♀.

Spring Creek, VII, 16-29, 1912, (J. C. Bradley), 5 ♂, 1 ♀, 1 juv. ♂.

#### Florida.

Jacksonville, VIII, 25, 1911, (R. & H.), 8 ♂, 5 ♀.

Live Oak, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀.

Three of the species described by Scudder in 1892, *H. compactus*, *variegatus*<sup>53</sup> and *suturalis*, are inseparable from *H. rugosus*; though particularly based upon color pattern, not even sufficient color differences exist to enable one to choose various color forms such as are to be found in numerous other species of Orthoptera, where, however, names for these cannot be used owing to their multiplicity, intergradations and lack of specific importance. Other characters given to separate these "species" by Scudder are without exception worthless, this is due to their variability or to the fact that they are based upon differences which are so slight as to be unappreciable.

The specimen described, in 1901, by the same author as *H. citrinus*, is merely a very dark specimen of the present species, no other characters are given nor do any exist to further distinguish the specimen.

Morse has described a single male from Clarendon, Texas, as *H. immaculatus*. This insect is but a very pale individual of the present species. The normal tegminal marking of *H. rugosus* is absent, the

<sup>53</sup> This name has already been correctly synonymized by Blatchley, *Orth. of Indiana*, p. 270, (1903).

only remaining maculations suggesting those of *Pardalophora apiculata* (*H. tuberculatus* of authors), but much less distinct. This specimen, which shows the greatest amount of recession in color pattern of any individual of the present species we have seen, has in consequence, as is often true in such cases, a decidedly different facies, since the normal tegminal markings are all but obliterated.

In the present species minor differences exist in every large series in robustness, rugosity of the pronotum and angulation of the caudal margin of the same, length of tegmina, number and size of tegminal maculations and wing length. None of these differences are, however, of any geographic importance. The extremes in tegminal length of the material at present under consideration are as follows: males, 23.2 to 28 mm., females 28.8 to 35 mm. A number of the specimens before us of the present species from Nebraska exceed the maximum of these measurements, as is also true of western specimens of *Pardalophora phænicoptera*.

The specimens before us exhibit much variation in the number and situation of the tegminal maculations, varying from a type in which the tegmina are covered with small and more or less disconnected maculations, to one in which these markings are much fused, forming five or six broad irregular transverse bands.

All of the adult specimens from above the fall line and north of Winter Park, North Carolina, have the disk of the wings primrose yellow, varying much less frequently to wax yellow. Southward nearly one-half the specimens from localities below the fall line have this portion of the wings peach red to orange pink,<sup>54</sup> while the remainder vary from light orange yellow to citron yellow. As in the last species treated, the width of the wing band varies considerably.

This species begins to appear adult about the middle of July, and by late August and early September is found mature in the largest numbers over that portion of its range treated in the present paper. The species is widely distributed and common through upland fields (Virginia localities), in fields near woods and through the undergrowth, particularly of pine woods (other records), while at Stone Mountain, Georgia, it was found in bunch-grass growing on otherwise bare granite slopes. In southern Georgia and northern Florida it is usually rather uncommon, only seldom being found abundant locally (Spring Creek, Georgia; Jacksonville, Florida). The records given above are the most southern for the species in Florida.

<sup>54</sup> These specimens are distributed through the present series as follows: Winter Park, 4 ♂, 5 ♀; Columbia, 1 ♂; Bainbridge, 2 ♀; Spring Creek, 2 ♂; Jacksonville, 5 ♂, 1 ♀; Live Oak, 1 ♂.

**Dissosteira carolina** (Linnæus).*Maryland.*

Glen Echo, VII, 10, 1914, (H.), 1 ♀.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. &amp; H.), 2 ♂, 1 ♀, 1 juv. ♀.

Orange, VII, 21, 1913, (R. &amp; H.), 2 ♂.

Lynchburg, VII, 22, 1913, (R. &amp; H.), 1 ♂.

Montgomery County, (E. A. Smyth Jr.), 1 ♂, [Hebard Cln.].

Petersburg, VII, 23, 1913, (R. &amp; H.), 1 ♂.

*North Carolina.*

Weldon, VII, 24, 1913, (R. &amp; H.); "common as usual in dusty places."

Greensboro, VII, 26, 1913, (R. &amp; H.), 1 ♂, 1 ♀.

Goldsboro, VII, 25, 1913, (R. &amp; H.), 1 ♂.

Charlotte, VII, 27, 1913, (R. &amp; H.), 1 ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 ♂.

Florence, IX, 6, 1911, (R. &amp; H.), fairly common.

Magnolia, IX, 5, 1911, (R. &amp; H.), occasional.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 ♂, 2 ♀.

Dalton, VIII, 7, 1911, (R.), 1 ♂.

Thompson's Mills, (H. A. Allard), 1 ♂, [U. S. N. M.].

Silver Lake, VIII, 10, 1913, (J. C. Bradley), 1 ♂.

Vicinity of Stone Mountain, VIII, 3, 1913, (R. &amp; H.), 1 ♀.

Augusta, VII, 29, 1913, (R. &amp; H.), 1 ♀.

Macon, VII, 30-31, 1913, (R. &amp; H.), 1 ♀.

Albany, VIII, 1, 1913, (R. &amp; H.), 1 juv. ♀.

Isle of Hope, IX, 3, 1911, (R. &amp; H.), occasional.

Billy's Island, XI, 1912, (J. C. Bradley), 2 ♂, 5 ♀.

Bainbridge, IX, 3-7, 1910, (J. C. Bradley), 1 ♂, 2 ♀.

No geographic variation appears to exist in the present series of this very widely distributed and ubiquitous species. Extremes in tegminal length are as follows: males, 29.3 to 33 mm., females, 32.5 to 40 mm. The species is everywhere to be found along dusty roads and on more or less bare spots in waste land. It is not nearly as abundant below the fall line south of central North Carolina, however, as in the Piedmont region, and has not been taken anywhere south of Enterprise, Florida. Sufficient work has been done in southern Florida to warrant the statement that the species is not to be found in that region.

**Spharagemon crepitans** (Saussure). Pl. XII, figs. 9, 10.*Georgia.*

St. Simon's Island, VIII, 30, 1911, (H.), 1 ♂, 3 ♀.

Brunswick, VIII, 30, 1911, (H.), 3 ♂, 3 ♀.

Cumberland Island, VIII, 31, 1911, (R. &amp; H.), 5 ♂, 3 ♀.

*Florida.*

Jacksonville, (T. J. Priddey), 2 ♀, [Hebard Cln.].

Atlantic Beach, VIII, 24, 1911, (H.), 4 ♂.

Pablo Beach, VIII, 11, 12, 1905, (R. &amp; H.), 2 ♂, 4 ♀.

Cedar Keys, VIII, 15, 1905, (R. &amp; H.), 1 ♂, 1 ♀.

The present insect may be separated from its nearest ally, *S. bolli*, by the following characters: form more attenuate; cephalic margin of pronotum more produced mesad and with margin of crest of prozona usually straight and horizontal throughout; tegmina with proximal lobe of costal margin more pronounced; wings with disk



usually a more obscure shade of yellow and with distal section more generally, but nowhere as strongly, suffused; caudal tibiae with proximal whitish portion suffused with brown, adjacent black band not as sharply defined, remaining distal portion uniform, but in different specimens varying from cinnamon-buff to vinaceous-rufous; general coloration much more uniform (figs. 9 and 10). The present series shows clearly that the caudal tibiae are never as highly colored as in *S. bolli*, and are in the majority of specimens cinnamon-buff.

The authors unfortunately once confused the species with *S. bolli*, the last two records given above having been referred to that species.<sup>55</sup>

This beautiful insect was found abundant at Cumberland Island, Georgia, on the sandy soil of a live oak "hammock" near the shore, but a thunder storm and limited time preventing the capture of a large series; it was found very scarce in a similar environment at St. Simon's Island and occasional at Brunswick, Georgia, and Atlantic Beach, Florida. The specimens taken at Pablo Beach and Cedar Keys, Florida, were found in open palmetto scrub and in palmetto scrub in pine woods, respectively.

The species has never been found far inland from the ocean (Davis has recorded a specimen from Gainesville, Florida, in the Agricultural Experiment Station Collection; in this case we feel sure that an error has been made in labelling); it was described originally from Georgia, and the only definite locality other than those given above at which the species has been taken is Key West, Florida, though examination of the specimen, recorded as *S. bolli* from Carrabelle, Florida, by Morse, shows it to be this species.

**Spharagemon bolli** (Seudder).

*Virginia.*

Arlington, VII, 9, 1914, (H.), 1 juv. ♀.  
Fredericksburg, VII, 20, 1913, (R. & H.), 3 ♂, 5 ♀.  
Orange, VII, 21, 1913, (R. & H.), 5 ♂, 2 ♀.  
Lynchburg, VII, 22, 1913, (R. & H.), one colony.  
Petersburg, VII, 23, 1913, (R. & H.), 3 ♂, 1 ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 3 ♂, 5 ♀.  
Goldsboro, VII, 25, 1913, (R. & H.), 1 ♂, 2 ♀.  
Fayetteville, IX, 9, 1911, (R. & H.), 1 ♂, 3 ♀.

Greensboro, VII, 26, 1913, (R. & H.), 1 ♂.  
Charlotte, VII, 27, 1913, (R. & H.), 1 ♂, 2 ♀.  
Black Mountain, VII and VIII, 1912, (W. Beutenmüller), 3 ♂, 6 ♀, [Davis Cln.].

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂.  
Spartanburg, VIII, 6, 1913, (H.), 7 ♂, 1 ♀, 1 juv. ♀.  
Columbia, VII, 28, 1913, (R. & H.), 1 ♂.  
Manning, V, 28, 1914, (W. Stone), 3 juv. ♂, 1 juv. ♀.

*Georgia.*

Dalton, VIII, 7, 1913, (R.), occasional.

<sup>55</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 290, (1907).



Jasper, VIII, 5, 1913, (R.), 2 ♂, 2 ♀.  
 Sharp Mountain, VIII, 6, 1913, (R.),  
 1 ♂, 2 ♀.  
 Rabun County, VII, 1910, (W. T.  
 Davis), 2 ♂, 2 ♀.  
 Toccoa, VIII, 4-5, 1913, (H.), 2 ♂.  
 Currahee Mountain, VIII, 5, 1913,  
 (H.), 1 ♂, 1 ♀.  
 Thompson's Mills, X, 1909, (H. A.  
 Allard), 1 ♀, [U. S. N. M.].

Vicinity of Stone Mountain, VIII, 3,  
 1913, (R. & H.), 1 ♂.  
 Buckhead, VIII, 2, 1913, (R. & H.,  
 Bradley), 8 ♂, 5 ♀.  
 Warm Springs, VIII, 9-10, 1913,  
 (R.), 4 ♂, 7 ♀.  
 Macon, VII, 30-31, 1913, (R. & H.),  
 3 ♀.

No geographic variation is shown in the present material, but individuals of many series vary greatly in size, tegminal length, general coloration and intensity and recession of color pattern. The extremes of tegminal length are as follows: males 22.6 to 28 mm., females, 27.8 to 33 mm.

The majority of specimens are of different shades of brown, moderately maculate and with caudal femora weakly thrice banded with a darker shade. A very few females are considerably paler, nearly immaculate, with the bands on the caudal femora greatly obscured, while a number of the males and two females are nearly black in general dark coloration, but have the color pattern nearly always decidedly intensified. None of these variations indicate any geographic significance, as all of the larger series include specimens of the palest as well as darkest coloration.

The present insect is widely distributed and abundant in upland situations, particularly in and about oak or mixed oak and pine woods of the Piedmont region. In the lower country it is found common in pine and oak woods as far south as Weldon, North Carolina; south of this in the lower country it is rarely met with and always in very few numbers (Goldsboro and Fayetteville, N. C., Florence, S. C., Thomasville, Ga.). The species has not been found southeast of Florence and Denmark, South Carolina; Macon and Thomasville, Georgia, and Tallahassee, Florida.

***Spharagemon collar wyomingianum* (Thomas).**

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.),  
 1 ♂, 1 ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 1 ♂.  
 Billy's Island, VI, 1912, (J. C. Brad-  
 ley), 3 ♂.

Bainbridge, IX, 3-7, 1910, (J. C.  
 Bradley), 1 ♀.  
 Spring Creek, VI-VII, 1911-12, (J. C.  
 Bradley), 1 ♂, 1 ♀.

*Florida.*

Live Oak, VIII, 26, 1911, (H.), 1 ♂,  
 1 ♀.

Previously recorded specimens from Thomasville, Georgia, and Fernandina and Gainesville, Florida, are inseparable from the present series; this is also true of one male recorded by the authors as *S.*

*cristatum*<sup>56</sup> from Albany, Georgia. The latter specimen is, however, somewhat larger, with longer tegmina and greater pronotal dimensions than any other specimen in the present series.

All of the material here studied belongs to one and the same geographic race of *S. collare*, but agrees perfectly with none of the known races as Morse has defined them. Taking Morse's differential characters<sup>57</sup> the series falls under *S. c. wyomingianum* in having a head which in facial aspect is nearly subequal in width, with more prominent eyes and in the proximal fuscous bands on the inside of the caudal femora being but faintly or not at all connected; in respect to size, however, the series agrees with the larger *S. c. scudderi*; the pronotal crest is very high, suggesting a very strong tendency toward *S. cristatum*. The increase in size of this series over New England individuals of *S. c. wyomingianum*, with accentuation of pronotal cristation, may be due to geographic variation, but the specimens before us from Virginia show no such variation, agreeing with material from Florida. Study of the genus, with large series from all portions of its distribution, can alone determine the validity and distributional extent of the races of the present species.

*Measurements (in millimeters).*

♂	Length of body.	Length of pronotum.	Height of pronotal crest.	Length of tegmen.	Length of caudal femur.
Petersburg, Va.....	23.3	6.9	2.4	26.	14.7
Augusta, Ga.....	23.9	6.2	2.2	25.1	14.4
Billy's Island, Ga.....	22.5-23.9	6.-6.2	2.1-2.3	24.-25.3	13.4-14.
Albany, Ga.....	26.2	7.1	2.5	28.	14.7
Thomasville, Ga.....	21.-23.	6.1-6.5	2.-2.2	21.2-25.4	11.6-14.
Live Oak, Fla.....	23.2	6.6	2.1	24.7	14.
♀					
Petersburg, Va.....	30.5	7.3	2.5	28.8	16.3
Thomasville, Ga.....	24.8-28.3	6.9-7.9	2.2-2.4	25.5-27.	15.-15.7
Bainbridge, Ga. <sup>58</sup> .....	28.2-29.9	7.4-8.3	2.5-2.9	27.8-29.3	15.3-16.
Gainesville, Fla.....	26.	7.1	2.4	25.4	15.8

The present ammophilous species was found very scarce in a sandy field overgrown with scattered low weeds (Petersburg), only one specimen was found in a sandy scrub oak area (Augusta), while a pair were discovered in a sandy cotton field (Live Oak).

<sup>56</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 593, (1911).

<sup>57</sup> *Psyche*, VII, p. 295, (1895).

<sup>58</sup> As Spring Creek is but a few miles from Bainbridge, we have here included the measurements of the female from that locality.

**Scirtetica marmorata picta** (Seudder).*North Carolina.*

Southern Pines, 1906, 1 ♀, [U. S. N. M.].  
 Wrightsville, IX, 7, 1911, (R. & H.), 2 ♂.  
 Winter Park, IX, 7, 1911, (R. & H.), 5 ♂, 1 ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂.  
 Columbia, VII, 28, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 1 ♂, 2 juv. ♂.  
 Warm Springs, VIII, 9-10, 1913, (R.), 1 juv. ♀.  
 Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♂, 1 ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 1 ♂, 1 ♀.

St. Simon's Island, VIII, 30, 1911, (R. & H.), 2 ♂, 6 ♀.  
 Brunswick, VIII, 30, 1911, (H.), 6 ♂.  
 Cumberland Island, IV, 29, 1911, (J. C. Bradley), 1 ♂; VIII, 31, 1911, (R. & H.), 1 ♀.  
 Spring Creek, VI-VIII, 1911-13, (J. C. Bradley), 6 ♂, 1 ♀.

*Florida.*

Jacksonville, V, 1885, (W. H. Ashmead), 1 ♂, [Hebard Cln.]; VIII, 25, 1911, (R. & H.), 4 ♂, 3 ♀;  
 IX, 5, 1911, (W. T. Davis), 2 ♂.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 1 ♀.  
 Live Oak, VIII, 26, 1911, (R. & H.), 5 ♂, 2 ♀.  
 Enterprise, V, 11, 1 ♂, [U. S. N. M.].  
 Gotha, 1 ♂, [U. S. N. M.].

The intergradation between this geographic race and *S. m. marmorata*, shown by the material recorded above from southern North Carolina, has recently been fully treated by the present authors.<sup>59</sup>

The general coloration in the present series ranges from clove brown to ferruginous, often more or less strongly washed with gray.

The present insect is also ammophilous and is found usually in small colonies scattered through the woods in the more sandy situations. It was found above the fall line, but near its very edge at Columbia, "on sand among black jack oaks," and at Augusta, "in sandy tract covered with scrub oaks," at which localities long search revealed but five specimens, of which four were immature. These localities indicate the extreme northwestern distribution of the insect, which is found in the largest numbers in the low country through the more sandy portions of the pine forests, in which situations frequent scrub oaks are usually to be found as well. On the Gulf of Mexico the insect has been taken as far west as Gulfport, Mississippi.

**Psinidia fenestralis** (Serville).*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.), 2 ♂, 1 ♀, 1 juv. ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 1 ♂.  
 Beaufort, end of VII, 1909, (F. Sherman Jr.), 1 ♂, [N. C. Dept. Agr.].

Wrightsville, IX, 7, 1911, (R. & H.), 1 ♂, 3 ♀.  
 Winter Park, IX, 7, 1911, (R. & H.), 3 ♂, 3 ♀.  
 Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂, 1 ♀.

<sup>59</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, p. 254, (1912). See also Morse, Carnegie Inst. Wash., Publ. No. 18, p. 37, (1904).

*South Carolina.*

- Florence, IX, 6, 1911, (R. & H.), 5 ♂, 2 ♀.  
 Columbia, VII, 28, 1913, (R. & H.), 2 ♂, 1 ♀.  
 Sumter, V, 30, 1914, (W. Stone), 1 ♂, [A. N. S. P.].  
 Isle of Palms, VIII, 15, 1913, (R.), 16 ♂, 22 ♀.  
 Sullivan Island, IX, 5, 1911, (R. & H.), 1 ♀.  
 Ashley Junction, VIII, 15, 1913, (R.), 1 juv. ♀.  
 Yemassee, IX, 4, 1911, (R. & H.), 1 ♂, 2 ♀.

*Georgia.*

- Augusta, VII, 29, 1913, (R. & H.), 1 ♂, 1 ♀.  
 Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♂, 2 ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 1 ♀; XII, 1908, (H.), 1 ♂.  
 Offerman, IV, 22, 1911, 1 ♀, [Ga. State Cln.].  
 Brunswick, VIII, 30, 1911, (H.), 1 ♂, 1 ♀.

- St. Simon's Island, VIII, 30, 1911, (R. & H.), 4 ♂, 14 ♀.  
 Cumberland Island, IV, 29, 1911, (J. C. Bradley), 2 ♂; VIII, 31, 1911, (R. & H.), 2 ♂, 4 ♀.  
 Billy's Island, VI, 1912, (J. C. Bradley), 4 ♂, 1 ♀.  
 Oglethorpe, VII, 1, 1910, (J. C. Bradley), 1 ♀.  
 Unadilla, 1 ♂, [Ga. State Cln.].  
 Albany, VIII, 1, 1913, (R. & H.), 1 ♀.  
 Bainbridge, IX, 1910, (J. C. Bradley), 7 ♂, 3 ♀.  
 Spring Creek, VI-VIII, 1911-13, (J. C. Bradley), 28 ♂, 31 ♀, 1 juv. ♀.

*Florida.*

- Jacksonville, VIII, 25, 1911, (R. & H.), 2 ♂, 6 ♀; XI, 5, 1911, (W. T. Davis), 2 ♂, 1 ♀.  
 Ortega, IX, 6, 1913, (W. T. Davis), 2 ♂, 1 ♀.  
 Pablo Beach, VI, 25, 1912, (J. C. Bradley), 1 ♂, 1 ♀; IX, 5, 1911, XI, 4, 1913, (W. T. Davis), 1 ♂, 2 ♀.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 10 ♂, 7 ♀.

Much variability in size and wing length is shown by the above material, but this has apparently no geographic significance. The specimens from the Isle of Palms are as a whole large and show the greatest variation of any series in tegminal length, the extremes in that dimension measuring as follows: males, 19.5 to 23.6 mm.; females, 22.4 to 26.8 mm.

The species shows three pronounced types of alar disk coloration; yellow, orange and pink. In the series of specimens from localities south to New Jersey such coloration is found to be baryta yellow (yellow value), light jasper red (pink value) and occasionally bitter-sweet pink or pale yellow orange, showing that in this region the yellow and pink color forms exist, while occasional specimens of the two types are found with an orange tinge. The more southern series above listed shows no specimens in which this coloration is yellow, as in this series it is found to be light jasper red (pink value), flame scarlet (orange value) and frequently bittersweet pink or bittersweet orange, showing that in the southeastern United States the pink and orange color forms with intergradients exist. We have the pink type from as far south as the Isle of Palms, South Carolina; all of the Georgia and Florida material belongs either to the orange type or to that type with a slight pinkish suffusion.

In the present series a great number of specimens have the distal

portion of the wing beyond the wing-band heavily suffused, leaving only a nearly circular hyaline spot; this varies to individuals which have this portion of the wing wholly hyaline. In the paler series the majority of specimens show this latter condition, but great variation everywhere exists.

In coloration the present material shows all phases of intensification and recession of color pattern, tegmina ranging from those which are nearly immaculate to a much mottled and speckled type, and individuals which are in general coloration very pale to others which are very dark. In the present species the color pattern is most pronounced in dark individuals and is often almost obsolete in very pale specimens.

This ammophilous species is found everywhere in sandy situations over the coastal plain of the southeastern United States; it was taken at the fall line (Petersburg, Weldon, Columbia, Augusta), but has not been definitely recorded from the Piedmont plateau. The range of the species extends far northward, and, south of the fall line, far westward of the region treated in the present paper.

***Trimerotropis maritima* (Harris).**

- Plumpoint, Maryland, VIII, 10, 1913, (W. T. McAtee), 2 ♂, 1 ♀, 1 juv. ♀; VII, 7, 1912, X, 18, 1912, 1 ♂, 6 ♀, [all U. S. N. M.].  
 Piney Point, Md., VII, 4, 1879, 1 ♀; VIII, 12, 1878, 1 ♀, [U. S. N. M.].  
 Cedar Island, Virginia, VII, 13, 1914, (H. G. Dyar), 2 ♂, [U. S. N. M.].  
 Fortness Monroe, Va., VI, 8, 1884, 1 ♂, [Hebard Cln.].  
 Oceanview, Va., VIII, 9 and 10, 1904, (A. N. Caudell), 6 ♂, 1 ♀, [U. S. N. M.].  
 Beaufort, North Carolina, end of VII, 1909, (F. Sherman Jr.), 2 ♂, 1 ♀, [N. C. Dept. Agr.].  
 Wilmington, N. C., VII, 1906, (R. S. Wolgum), 4 ♂, 1 ♀, [N. C. Dept. Agr.].  
 Smith Island, N. C., X, 1906, (F. Sherman Jr.), 5 ♂, 1 ♀, [N. C. Dept. Agr.].  
 Atlantic Beach, Florida, VIII, 25, 1911, (R. & H.; on strand), 1 ♂, 1 ♀.

As previously stated by the authors, two of the six females recorded from Cape Henry, Virginia, have the caudal tibiae showing a pinkish suffusion. No intergradation whatever with *T. citrina* is to be found, the hypothesis that hybridization with that species occurred,<sup>60</sup> being due to the fact that it was not recognized that both red and yellow tibiae are found in *maritima*. It is true that over the greater portion of the range of the present insect, individuals of the species have yellow tibiae, but from Cape May, New Jersey, southward, specimens are sometimes met with having reddish tibiae. Of the series here recorded one male (Oceanview) and one female (Plumpoint) have the caudal

<sup>60</sup> Morse, Carnegie Inst. Wash., Publ. No. 18, p. 38, (1904). See also Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1910, p. 631, (1911).

tibiae suffused with reddish. Numerous specimens from south of Virginia have the wing-band unusually broad and solid for the species, reaching a maximum width on the radiate field of 6 mm. in some males and 7 mm. in some females.

This species is a native of the sand dunes and sandy strand of the Atlantic coast; it has, however, been found some distance inland in areas of loose sand. It has been previously correctly recorded from as far south as the coast of North Carolina.

*Trimerotropis citrina* Seudder.

*Pennsylvania.*

Philadelphia Neck, VII, 29, (H. W. Wenzel), 1 ♀, [A. N. S. P.].

*Maryland.*

Chesapeake Beach, IX, 17, 1914, (A. N. Caudell), 2 ♂, 1 ♀, [U. S. N. M.].

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.), 5 ♂, 3 ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 1 ♀.  
Fayetteville, IX, 9, 1911, (R. & H.), 1 ♂.  
Wrightsville, IX, 7, 1911, (R. & H.), 1 ♀.  
Lake Waccamaw, IX, 8, 1911, (R. & H.), 4 ♂, 2 ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 2 ♀.  
Columbia, VII, 28, 1913, (R. & H.), 1 ♂, 2 ♀.  
Sullivan Island, IX, 5, 1911, (R. & H.), 1 ♂, 1 ♀.  
Yemassee, IX, 4, 1911, (R. & H.), 3 ♂, 1 ♀.

*Georgia.*

Clayton, 2,000 feet, VI, 1909, (W. T. Davis), 1 ♀.  
Tallulah Falls, VII, 1910, (W. T. Davis), 1 ♂.  
Thompson's Mills, (H. A. Allard), 2 ♀, [U. S. N. M.].  
Atlanta, VIII, 30, 1913, (J. C. Bradley), 1 ♀.  
Silver Lake, VIII, 10, 1913, (J. C. Bradley), 1 ♂.

Buckhead, VIII, 2, 1913, (R. & H.), 1 ♂.

Vicinity of Stone Mountain, VIII, 3, 1913, (J. C. Bradley, R. & H.), 3 ♂, 1 ♀.

Macon, VII, 30-31, 1913, (R. & H.), 2 ♀.

Tybee Island, IX, 2, 1911, (H.), 1 ♂.

Jesup, IX, 1, 1911, (R. & H.), 1 ♂.

St. Simon's Island, VIII, 30, 1911, (R. & H.), 1 ♂, 2 ♀.

Brunswick, VIII, 30, 1911, (H.), 3 ♀.

Cumberland Island, VIII, 31, 1911, (R. & H.), 4 ♂, 11 ♀.

Hebardville, V, 15, 1915, (H.), 1 juv. ♀.

Billy's Island, VI, 1912, (J. C. Bradley), 1 ♀.

Homerville, VIII, 27, 1911, (R. & H.), 4 ♂.

Thomasville, XII, 1908, (H.), 1 ♂.

Unadilla, VI, 25, 1910, (J. C. Bradley), 2 ♂, 2 ♀.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀; IX, 1, 1910, (J. C. Bradley), 1 ♀.

Bainbridge, IX-X, 1910, (J. C. Bradley), 4 ♂, 5 ♀.

Spring Creek, VIII, 26-28, 1913, (J. C. Bradley), 1 ♂.

*Florida.*

Jacksonville, IX, 7, 1913, (W. T. Davis), 1 ♀; XI, 5, 1911, (W. T. Davis), 1 ♂.

Atlantic Beach, VIII, 25, 1911, (R. & H.), 4 ♂, 1 ♀.

Pablo Beach, IX, 27, 1913, (W. T. Davis), 1 ♂.

Daytona, XI, 11, 1911, (G. P. Englehardt), 1 ♂, [B. I.].

St. Vincent Island, XI, 1, 1910, (W. L. McAtee), 2 ♀, [U. S. N. M.].

Little variation of any kind is shown by the great majority of specimens in the present series. Morse's supposition that



this insect hybridizes with *T. maritima* is explained under that species.<sup>61</sup>

Although the present species is essentially a midsummer insect, material from southern Georgia shows that adults are not scarce in that region as late as October, and that battered individuals are found there, though rarely, as late as December. This ammophilous insect is found in sandy situations over its range, from the ocean beaches (where, however, it is rarely found and in few numbers) to the waste land and river borders of the southern mountain valleys and Piedmont region and far west of the area treated in the present paper. It is most abundant, however, in the low country south of North Carolina, and is everywhere to be found in the sandy regions of southern Georgia and northern Florida. In extreme southern Florida the species is decidedly scarce, a few specimens having been recorded only from Key West. The most northeastern localities at which the species has been found are Philadelphia Neck, Pennsylvania, and Maryland, though the occurrence of the species north of southern Virginia is very exceptional.<sup>62</sup>

***Trimerotropis saxatilis* McNeill.**

Highlands, North Carolina, IX, 1906,	1 ♂, 1 ♀.
2 ♂, 2 ♀, [U. S. N. M.].	Stone Mountain, Georgia, 1,000-1,686
Rabun Bald, Georgia, 4,000-4,800 feet,	feet, VIII, 3, 1913, (Bradley, R. & H.),
VIII, 21, 1913, (J. C. Bradley),	83 ♂, 70 ♀.

The following notes were taken from observations made on Stone Mountain, Georgia, a granitic knob rising abruptly 686 feet above the surrounding Piedmont peneplain, which in this vicinity has a mean elevation of 1,000 feet. "*T. saxatilis* found on bare granite slopes where areas of lichens were the only vegetation to be found. The northern face of the mountain is precipitous. The species was plentiful about the gently rising slopes at the south base of the mountain where the bare rock surfaces were first encountered, particularly so in areas of rock fragments near the adjacent bunch grass vegetation. On ascending further the species was found less numerous, becoming quite infrequent upon the bare rock areas on the slopes clothed with open pine woods, but at the summit, where large bare rock areas occupy the greater portion of the surface, the insect was again

<sup>61</sup> See Hebard, *Ent. News*, XXVI, p. 403, (1915). The south Florida species, *Trimerotropis acta*, is there described and compared with *maritima* and *citrina*. The misidentifications of that species, as *maritima* by Caudell, from Palm Beach, and as *citrina* by Davis, in part, from Ocean Beach near Miami, are there corrected.

<sup>62</sup> The record of this species from Lehigh Gap, Pennsylvania, applies to *Spharagemon saxatile planum* Morse. See Rehn, *Ent. News*, XIII, p. 311, (1902).

found in considerable numbers. The flight of the species is distinctive; taking wing with great rapidity, individuals fly very low for a short distance, but evince great wariness and often have to be approached a number of times before it is possible to come within striking distance. Only infrequently was the flight accompanied by a sound, this being a faint clicking whirr like that occasionally produced by individuals of the western *T. cyaneipennis*. The granite surfaces were for the greater part stained to a blackish hue and the majority of specimens were exactly of this coloration, a few were paler, matching similar areas of rock surface, while occasional specimens were mottled with greenish and these exactly blended with the lichenose areas of rock."

The disk of the wings varies in the present species from light dull green-yellow to the palest green-yellow.

Except for the color variation mentioned above, little variation is to be found in the present series. Extremes of tegminal length measure as follows: males 18.6 to 21.4 mm., females 22.8 to 27.2 mm.

In Georgia the species is known only from White Oak Gap and Flat Rock on Sand Mountain, outside of the localities given above. The distribution of this species is highly discontinuous, as it is confined to bare rock surfaces; it has not been taken in the Appalachians north of Highlands, North Carolina.

**Romalea microptera** (Beauvois).

1839. *Romalea marci* Serville, Hist. Nat. Ins., Orth., p. 623. [Near South Carolina.]

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.), 1 ♂.

*Georgia.*

Social Circle, X, 18, 1907, (J. F. Lewis), 1 ♂, [U. S. N. M.].

Bainbridge, VI, 2, 1911, (J. C. Bradley), 1 juv. ♀.

Waycross, V, 8, 1911, 1 juv. ♂, 1 juv. ♀, [Ga. State Cln.].

Hebardville, late V, 1915, (Wm. Walker), 1 juv. ♂, 2 juv. ♀, [Hebard Cln.].

Isle of Hope, IX, 3, 1911, (R. & H.), 2 ♂, 2 ♀.

*Florida.*

Warrington, (A. H. Gale), 3 juv. ♀, [Hebard Cln.].

Jacksonville, VIII, 25, 1911, (R. & H.), 1 ♀.

South Jacksonville, IX, 28, 1913, (W. T. Davis), 1 ♂.

Atlantic Beach, VIII, 24, 1911, (R. & H.), 2 ♂.

St. Petersburg, IV, 10, 1908, 1 juv. ♂, [A. N. S. P.].

Rockledge, 1 ♀, [A. N. S. P.].

Melbourne, (A. C. Sirdefield), 1 ♀, [U. S. N. M.].

Capron,<sup>63</sup> 1 juv. ♀, [Hebard Cln.].

Cocoanut Grove, VIII, 19, 1911, (J. W. Harshberger), 1 ♀, [A. N. S. P.].

Turners, (G. W. Morrill), 1 ♂, [U. S. N. M.].

There can be no question but that *Romalea marci* of Serville is

<sup>63</sup> This locality is the abandoned Fort Capron, situated near the present town of Viking.

based on the melanistic color phase of this species. The name should be synonymized, once and for all, under *microptera*.

These specimens exhibit the usual amount of individual variation in size. The Columbia and Social Circle males are typical of the melanistic phase, while all of the Isle of Hope specimens and that from South Jacksonville have decided tendencies in the same direction, the dorsum of the head, pronotum and abdomen, as well as the tegmina and limbs, showing much more blackish than usual in the yellow phase.

The range of this species is now known to extend north in the South Atlantic States as far as Cabarrus County, North Carolina (Sherman and Brimley).

The species was taken in pine woods undergrowth (Jacksonville and Isle of Hope), in palmetto "hammock" (Atlantic Beach) and in grass in waste field (Columbia).

Having personally quite carefully examined the more austral portions of both Carolinas, as well as the greater portion of the State of Georgia, it seems very certain to us that the locality given by Serville in his original description of *Acridium coloratum*<sup>64</sup> (*Chromacris colorata* of present-day nomenclature) is erroneous. His remarks are "Donné par M. Marc du Havre, qui l'a reçu d'une partie de l'Amérique, voisine de la Caroline du Sud." We are convinced that the specimen he had did not come from the eastern United States, but probably was of Mexican origin, as the species is so striking, and so universally secured by collectors who encounter it, that it must make itself quite in evidence in its native habitat.

***Stenaecris vitreipennis* (Marschall).**

*North Carolina.*

Lake Ellis, V, 14, 1906, 1 ♂, 1 ♀,  
[U. S. N. M.].  
Wilmington, VIII, 1, 1909, 2 ♂, 2 ♀,  
[B. I.].

*Georgia.*

Jesup, IX, 1, 1911, (R. & H.), 1 ♂.  
Blackshear, V, 10, 1911, 1 ♀, [Ga.  
State Cln.].  
Thalman, IV, 28, 1911, 1 ♀, [Ga.  
State Cln.].  
Mixon's Hammock, V, 16, 1915, (H.),  
1 ♂.

Billy's Island, VII, 1912, (J. C. Bradley), 1 ♀.

Chase Prairie, IX, 5 and 15, 1913.  
(J. C. Bradley), 3 ♂, 5 ♀, 1 juv. ♂.

*Florida.*

Jacksonville, V and VIII, 1885, (W. H. Ashmead), 1 ♂, 1 juv. ♂; (T. J. Priddey), 1 ♂, [all Hebard Cln.].  
South Jacksonville, IX, 3, 1913, (W. T. Davis), 1 ♂.  
Atlantic Beach, VIII, 24, 1911, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♀.

<sup>64</sup> *Hist. Nat. Ins., Orth.*, p. 675, (1839).

- Daytona, XI, 11, 1911, 1 ♂, 1 ♀, [U. S. N. M.], Enterprise, V, 13 and 15, 1 ♂, 1 ♀, [U. S. N. M.].  
 Silver Spring, XI, 25, 1911, 1 ♂, Rockledge, II, 5, 1880, 1 ♂, [U. S. N. M.].  
 [U. S. N. M.]. Melbourne, III, 1 ♂, [A. N. S. P.].

Six specimens, the Jesup male, two males from Chase Prairie, a Jacksonville male and the Atlantic Beach pair, have the pale lateral line on the head, ventral margin of the lateral lobes and pleura distinctly indicated, faint and incomplete traces of it existing in several other specimens. The Jesup male is the only one having the dorsal surface of the head, pronotum and tegmina faintly brownish, the others, unless by evident discoloration, having this area at least in part green. The three young all show a narrow dark medio-longitudinal line on the head, pronotum and attingent edges of the undeveloped tegmina and wings. The antennæ in these are similar in form to those of the adults.

The range of this species is much more restricted than is the case with the frequently associated *Leptysma marginicollis*. The most northern record known is from Lake Ellis, North Carolina (Sherman and Brimley), while southward it is unknown from any localities more elevated than Waycross and Thomasville, Georgia. The species is thus seen to extend over but a portion of the coastal plain and southward it has been taken as far as Miami, Florida, the most western known point of its occurrence being Appalachicola.

All of the material taken by us was secured in high grasses or rushes in or around swamp or marsh land, except in the Okeefeenokee Swamp where the species was everywhere to be found in the dense green undergrowth of small saplings growing out of water in the almost impenetrable swamp forest.

***Leptysma marginicollis* (Serville).**

*Maryland.*

- Piney Point, VIII, 9, 1913, (W. L. McAtee), 1 juv. ♂, [U. S. N. M.].  
 Washington, D. C., 1 juv. ♀, Hebard Cln.].

*Virginia.*

- Alexandria, V, 27, (G. S. Miller), 1 ♂, 2 ♀, [U. S. N. M.].  
 Dismal Swamp, VII, 22, (G. P. Englehardt), 1 ♂, [B. I.].

*North Carolina.*

- Roanoke Island, VII, 25, (G. P. Englehardt), 1 ♀, [B. I.].  
 Greensboro, VII, 26, 1913, (R. & H.), 1 juv. ♂, 7 juv. ♀.

- Fayetteville, IX, 9, 1911, (R. & H.), 2 ♂.  
 Wilmington, IX, 8, 1911, (R. & H.), 1 ♂.  
 Lake Ellis, V, 16, 1906, 1 ♀, [U. S. N. M.].

*South Carolina.*

- Ashley Junction, VIII, 15, 1913, (R.), 6 juv. ♂, 7 juv. ♀.  
 Yemassee, IX, 4, 1911, (R. & H.), 1 juv. ♂, 1 juv. ♀.

*Georgia.*

- Augusta, VII, 29, 1913, (R. & H.), 1 juv. ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♂.

- Billy's Island, V, 16, 1915, (H.), 1 ♀; VI-VII, 1912, (J. C. Bradley), 1 ♂, 1 ♀.  
 Honey Island, VI, 1, 1912, (J. C. Bradley), 1 ♀.  
 Chase Prairie, IX, 5, 1913, (J. C. Bradley), 1 juv. ♀.
- Florida.*
- Jacksonville, VIII, 1885, (W. H. Ashmead), 1 ♂, (T. J. Priddey), 1 ♀, [all Hebard Cln.].
- South Jacksonville, IX, 7, 1913, (W. T. Davis), 1 ♀.  
 Ortega, Duval County, IX, 6, 1913, (W. T. Davis), 1 ♀, 1 juv. ♀.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 6 ♂, 3 ♀, 1 juv. ♂, 4 juv. ♀.  
 Pablo Beach, IX, 5, 1913, (W. T. Davis), 1 ♂.  
 Baldwin, III, 7, 1879, (E. A. Schwarz), 1 ♂, [U. S. N. M.].  
 Enterprise, V, 24 and 25, 2 ♂, [U. S. N. M.].

The usual increase in size southward is less marked in this species than is generally the case, and then only in the female sex. In both sexes any geographic size tendencies are discounted by the very great individual size variation, the extreme males of the Atlantic Beach series, for instance, measuring as follows:

Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
28.7 mm.	4.6 mm.	23.6 mm.	12.5 mm.
31.     "	5.2     "	28.     "	14.6     "

The angle of the fastigium, while individually variable, is as a rule more acute in the more southern specimens than in the others, say from Raleigh, North Carolina. The young from Ashley Junction represent the four instars preceding maturity, while those from Greensboro lack the last two stages. From the evidence in hand it seems that, over at least a considerable portion of its range, this species occurs in an adult condition throughout the year.

The greenish color phase is more in evidence in the young than in adults, but the Honey Island females are quite greenish, the Billy's Island females similar, but to lesser degree. A medio-longitudinal line of purplish or pinkish is indicated more or less distinctly in the greater portion of the young.

This marsh and swamp-loving species generally frequents tall grasses and reeds in the situations preferred by it, but occasionally has been taken (Wilmington) in high bushes on the edge of a gum swamp. The wet spots in pine woods are much frequented by it.

*Individual Variability and Dimorphism in Schistocerca alutacea and obscura.*

The authors have in their hands a series of over five hundred specimens belonging to these two species as understood by them. The form for which Scudder used the name *obscura*<sup>65</sup> is well separated

<sup>65</sup> *Proc. Amer. Acad. Arts and Sci.*, XXXV, p. 465, (1899).



from *alutacea*, except in the case of brown-phase females, regarding which see below under *obscura*. The other species has been the cause of considerable difference of opinion, two names, *alutacea* Harris and *rubiginosa* Scudder, the first based on striped individuals, the other one on brown or reddish brown unstriped specimens, being involved. The present authors have individually and collectively expressed their opinions regarding the specific identity of these forms,<sup>66</sup> and in the light of the present material we see no necessity for changing, or in any way modifying, our former conclusions.

In both species we find developed two color phases: one olivaceous or deep wine color, having a medio-longitudinal yellow stripe on the head, pronotum and anal area of the tegmina, the other being of a more or less uniform brown or red brown color without any distinct medio-longitudinal line. Correlated with these color differences we usually find readily perceived structural differences in both *obscura* and *alutacea*, the striped phase typically having the pronotum more tectate, more compressed and appreciably narrowing cephalad, and the head narrower with the fastigium more produced. The brownish phase typically has the pronotum less tectate, more robust and less narrowing cephalad, while the head is broader with the fastigium blunted, broader and more declivent. The first of these forms in *alutacea* is *alutacea* s.s., the second is *rubiginosa*, regarding the distinctness of which Morse says,<sup>67</sup> "typically these two species differ in color, structure and haunts." Later the same author modifies his first statement, restricting it to New England material<sup>68</sup> as follows: "It is very probable that some so-called species are but forms of one which varies greatly in color and structure. In New England the two forms known as *alutacea* and *rubiginosa* seem to be constantly different structurally, though *rubiginosa* has a color-variety resembling *alutacea*. Southward and westward the structural gap between the two seems to be bridged, and both vary much in size, color, form, and proportions of parts." If we were called upon to deal only with typical material, it would be an extremely simple matter to consider the two phases as species, but unfortunately a very considerable portion of our series is not typical, but apparently, and when carefully studied actually, intermediate not only in color but so, more rarely, however, in structure and proportions. The

<sup>66</sup> *Ent. News*, XIII, p. 89, (1902); *Ibid.*, p. 312, (1902); *PROC. ACAD. NAT. SCI. PHILA.*, 1907, pp. 292, 293, (1907).

<sup>67</sup> *Carnegie Inst. Wash.*, Publ. 18, p. 39, (1904).

<sup>68</sup> *Carnegie Inst. Wash.*, Publ. 68, pp. 43-44, (1907).



yellow line narrows and finally dies out, the fastigium broadens out and the pronotum and head become more robust toward the "*rubiginosa*" type in the intermediates in certain extensive series. We have such series of *alutacea* from a number of localities in New Jersey, South Carolina and Georgia. The proportionate depth of the caudal femora in general is greater in the *rubiginosa* type, but this is by no means an absolute rule, as some series of that phase show all sorts of variation in this respect. The "*alutacea*" phase, however, is more uniform in having the femora more slender. The number of scutes in the paginal pattern on the caudal femora also varies greatly and without phase correlation.

We have examined a number of New England specimens of "*alutacea*" and "*rubiginosa*" determined by Morse, and the remarks he has made about their differences hold true, but when material from New Jersey southward is considered the inter-relation of the two forms becomes so complicated that they cannot be separated when large series are considered.

Taking up the question from the standpoint of habitat, it is true that as a rule the striped types prefer moist areas with bracken, etc., while the brown forms are more at home in dry woods and brush, old fields and among dune thickets, although numerous specimens of each phase have been taken in the habitat preferred by the other. It is highly probable that the near future will show similar environmental preferences by other forms of this genus now considered of specific rank, but doubtless of no more standing relatively than the phases of *obscura* and *alutacea*. Sufficient field observations have been made, outside of those in the eastern United States, to convince us that in the genus *Schistocerca* color *per se* is, as a rule, a poor specific criterion, while sufficient laboratory experience has been had to convince us equally well that, in this genus, certain structural features are quite plastic, and in consequence to be used with caution and discrimination in diagnostic work.

The principle of dimorphism, which plays such an important part in the Orthoptera, satisfactorily explains to us the problem here considered. In the present cases the color differences are quite decided, with a fair number of non-typical specimens nearer one type than the other and a relatively smaller number really intermediate. The structural differences, generally correlated with the color differences, are typically quite appreciable, but their constancy fluctuates in different localities. Color dimorphism is known to exist in certain genera not distantly related to *Schistocerca* and

structural dimorphism, aside from the subject of macropterism and brachypterism, is found in certain Dermaptera and in the Orthoptera in certain groups of Phasmidæ, very frequently in the Acrydiinæ, in certain Truxalinæ (*Eritettix*, *Macneillia*, etc.) and in species of *Gryllus*.

The final word on this very perplexing question can be said only after careful breeding experiments have been made. As far as examination of dry material and field observations are concerned, we feel that little additional information, except purely statistical data, can be secured. We have had this problem in mind for over ten years and have utilized every opportunity to secure data bearing upon it, with the results here summarized.

***Schistocerca obscura* (Fabricius).**

*Delaware.*

Dover, (Macomber), 1 ♀, [A. N. S. P.].

*North Carolina.*

Wrightsville, IX, 7, 1911, (R. & H.),  
5 ♂, 5 ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 2 ♂,  
1 ♀.

Ashley Junction, VIII, 15, 1913, (R.),  
1 ♂.

*Florida.*

Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 1 ♀.

South Jacksonville, IX, 7 and 28, 1913,  
(W. T. Davis), 1 ♂, 1 ♀.

Ortega, Duval County, IX, 6, 1913,  
(W. T. Davis), 1 ♀.

*Georgia.*

Thompson's Mills, X, 1909, (H. A.  
Allard), 1 ♀, [U. S. N. M.].

Augusta, VII, 29, 1913, (R. & H.), 1 ♀.  
Albany, VIII, 1, 1913, (R. & H.), 1 ♂,  
2 ♀.

Savannah, VIII, 7, 1878, (Grote), 1 ♀;  
VIII, 22, 1881, (Howard), 1 ♀,  
[both U. S. N. M.].

Tybee Island, IX, 2, 1913, (R. & H.),  
2 ♂, 4 ♀.

Sandfly, IX, 3, 1911, (R. & H.), 1 ♀.

Cumberland Island, VIII, 31, 1911,  
(R. & H.), 5 ♂, 11 ♀.

The different form of the subgenital plate of the male is a constant and readily perceived diagnostic character for this species when compared with *alutacea*, to which it is closely related. The presence of dark bars on the dorsal surface of the caudal femora, and the general dark purplish or blackish color of the caudal tibiae, we find to be variable, the former, however, being generally distinctly indicated in striped specimens of both sexes of this species and frequently absent or very faint in brownish individuals. In consequence brown females, having the femora without dark bars on the dorsal surface, are with difficulty separated from similarly colored females of *alutacea*, the greater size of *obscura* being the best means of discrimination in such cases, as no constant differential structural features exist, as far as we can determine. We have before us one striped male from Wrightsville, North Carolina, which has the usual femoral bars practically absent, while of the "*rubiginosa*" type we have

four females of which but two have distinct indications of these bars, which are entirely absent in one (Tybee Island). The color of the caudal tibiae varies in the extent to which olivaceous green replaces part of the blackish purple, in the "*rubiginosa*" specimens warm browns replacing the olivaceous green. All of the Wrightsville series is striped, as is the case with the material from Florence, Ashley Junction, Augusta, Albany, Sandfly, Atlantic Beach, South Jacksonville and Ortega; the series from Tybee Island includes one brownish female and that from Cumberland three brown females. The latter all have the tegmina more or less distinctly multi-maculate with fuscous, while the similar phase female from Tybee Island is almost entirely plain.

The structural differences between the color phases follow the lines discussed in the preceding summary, while the extremes in size in the two sexes measure as follows:

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂ Detroit, Fla. ....	33.4 mm.	7.5 mm.	30.5 mm.	20.4 mm.
♂ Key Largo, Fla. ....	42. "	8.8 "	37.5 "	22.1 "
♀ Tybee Island, Ga. ....	49.5 "	10.2 "	44. "	27.8 "
♀ Tybee Island, Ga. ....	61.3 "	12.9 "	49.3 "	32. "

It will be seen from this that such size variation as is found can be considered purely individual and not geographic. All of the measured specimens are in the extreme striped condition, except the maximum male, which has the stripe stopping at the caudal margin of the pronotum and the general color quite brownish.

The range of this striking species in the southeastern States is chiefly confined to the country below the fall line, *i.e.*, the sands and gravels of the coastal plain and peninsular Florida, as it is apparently rare and local in the Piedmont region (Thompson's Mills, Georgia, and Druid Hill Park, Baltimore, Maryland).

On Tybee and Cumberland Islands and at Wrightsville the species was found among strand bushes and the low oaks, palmettoes, etc., there growing; at Florence, Augusta and Albany it frequented high weeds in or near fields, generally of cotton, and at Ashley Junction it occurred in long-leaf pine woods. It was common only occasionally, being generally but few in number and very frequently associated with *alutacea*.

***Schistocerca alutacea* (Harris).**

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 1 ♂.  
Wilmington, IX, 8, 1911, (R. & H.),  
8 ♂, 1 ♀.

Winter Park, IX, 7, 1911, (R. & H.),  
10 ♂, 8 ♀.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.),  
1 ♂.  
Isle of Palms, VIII, 15, 1913, (R.),  
1 ♂, 1 ♀.  
Ashley Junction, VIII, 15, 1913, (R.),  
15 ♂, 10 ♀, 1 juv. ♂.  
Yemassee, IX, 4, 1911, (R. & H.),  
14 ♂, 7 ♀.

*Florida.*

Jacksonville, (Priddey; Ashmead), 2  
♂, 3 ♀, [Hebard Cln.]; XI, 5, 1911,  
(W. T. Davis), 1 ♂; VIII, 25, 1911,  
(R. & H.), 5 ♂, 4 ♀.  
Atlantic Beach, VIII, 24-25, 1911,  
(R. & H.), 28 ♂, 27 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
1 ♂.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 1 ♀.  
Tybee Island, IX, 2, 1911, (R. & H.),  
2 ♂.

Isle of Hope, IX, 3, 1911, (R. & H.),  
6 ♂, 2 ♀.  
Sandfly, IX, 3, 1911, (R. & H.), 8 ♂,  
1 ♀.  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 1 juv. ♂.  
Brunswick, VIII, 30, 1911, (H.), 8 ♂,  
4 ♀.  
Jesup, IX, 1, 1911, (R. & H.), 5 ♂, 6 ♀.  
Groveland, Cannoche River, VII, 28,  
1913, (J. C. Bradley), 1 ♂.  
Billy's Island, VI-VII, 1912, IX, 1-5,  
1913, (J. C. Bradley), 10 ♂, 6 ♀.  
2 juv. ♂, 2 juv. ♀.  
Jordan's, Billy's Island, VIII, 31,  
1913, (J. C. Bradley), 3 ♂, 2 ♀.  
Suwannee Creek, VIII, 28, 1911,  
(R. & H.), 17 ♂, 2 ♀.  
Homerville, VIII, 27, 1911, (R. & H.),  
6 ♂.  
Albany, VIII, 1, 1913, (R. & H.), 3 ♂,  
2 ♀.  
Spring Creek, VII, 16-29, 1912, (J. C.  
Bradley), 8 ♂, 7 ♀, 1 juv. ♀.

Regarding this species, it seems most desirable to give under localities a summary of the color conditions, as well as the principal uncorrelated variational features, found in the adults of this extensive series. We have restricted ourselves to those features which bear upon the supposed distinctness of *alutacea* and *rubiginosa*.

Weldon. One, *rubiginosa* phase.

Wilmington. Seven, *alutacea* phase. Two, *rubiginosa* phase. Males. Considerable variation in head width in six *alutacea* phase, this feature not typical in most, one specimen has head as wide as similarly sized or even larger *rubiginosa* phase males. Frontal costa width not typical in all striped specimens.

Winter Park. Eighteen, all *rubiginosa* phase. Frontal costa and head width very variable, as much as the extremes of the two phases. One female has head and pronotum width typical of *alutacea* phase, but frontal costa and caudal femora typical of *rubiginosa* phase.

Columbia. One, *rubiginosa* phase.

Isle of Palms. Two, *rubiginosa* phase, but with head and pronotum decidedly (♂) or weakly (♀) striped.

Ashley Junction. Twenty-three, *alutacea* phase. Three, showing *rubiginosa* tendencies. Two, *rubiginosa* phase.

Yemassee. Eleven, *alutacea* phase. Two, practically intermediate in color. Eight, *rubiginosa* phase; the males (six) show considerable variation in head width, fastigium and frontal costa width and depth of caudal femora.

Augusta. One, intermediate in color and structure.

Tybee Island. Two, *rubiginosa* phase.

Isle of Hope. One, *alutacea* phase. Three, intermediate in color. Four, *rubiginosa* phase. The males (six) show no other structural intermediates, but specimens intermediate in color have deep femora.

Sandfly. Five, *alutacea* phase. Four, *rubiginosa* phase.

Brunswick. Eleven, *rubiginosa* phase. One, *alutacea* phase.

Jesup. Seven, *rubiginosa* phase. Four, *alutacea* phase. Males show little, and then connected, difference in fastigial width; costal width variation very considerable, but connected.

Groveland. One, *rubiginosa* phase.

Billy's Island. Fourteen, *rubiginosa* phase. One, intermediate. One, *alutacea* type.

Jordan's. Four, *rubiginosa* phase. One, *alutacea* phase.

Suwannee Creek. Eighteen, *rubiginosa* phase. One, *alutacea* phase. The latter ( $\sigma^7$ ) has the frontal costa no narrower than in numerous decided *rubiginosa* phase individuals.

Homerville. Five, *rubiginosa* phase. One, *alutacea* phase. Structural differences in fastigium in these but little and connected, extremes decided, as in the case of femoral depth.

Albany. Four, *alutacea* phase. One, *rubiginosa* phase. Males (three) all *alutacea*, one has frontal costa typical, others have this very much broader.

Spring Creek. Fifteen, *rubiginosa* phase.

Jacksonville. Eleven, *rubiginosa* phase. Four, *alutacea* phase. Those collected by ourselves (seven *rubiginosa*, two *alutacea*) show no marked structural differences in fastigium in striped and unicolorous individuals. Head width little variable and apparently with extremes connected. Femoral depth difference appreciable.

Atlantic Beach. Thirty-two, *rubiginosa* phase. Two, intermediate (maculate tegmina type). Twenty-one, *alutacea* phase. Specimens of *alutacea* phase have the frontal costa of usual *rubiginosa* width.

Live Oak. One, *alutacea* phase.

We also have before us from New Jersey alone, one hundred and twenty-eight specimens collected in southern New Jersey by Dr. Henry Fox,<sup>69</sup> a series of twenty-two from Stafford's Forge with exact habitat data, another of twelve from Taunton and a considerable

<sup>69</sup> Recorded by that author as "*S. alutacea* (Typical race); *S. rubiginosa* (= *rubiginosa* phase of *alutacea*), and *S. sp. cf. obscura* (= unicolorous phase of *obscura*).\" PROC. ACAD. NAT. SCI. PHILA., 1914, pp. 507-509, (1914).



number from the State secured by various collectors at numerous localities. These all bear out our above-expressed general conclusions. The Taunton series form a particularly interesting illustration of intergradation, which is also marked in the other lots where the series are of sufficient size. The only exception to the latter statement seems to be that the *alutacea* phase is very rare on the barrier beach coastal dunes, as we have seen but one individual (♀) of that phase which was taken in a strand habitat (Seaside Park, New Jersey). The Isle of Palms individuals also show a tendency toward *alutacea* in the indication of an incomplete stripe.

We have examined a series of Key West, Florida, individuals of both sexes, all being *rubiginosa* phase, and these show great variation in the width of the head.

The generally greater size of the individuals from the barrier beaches of New Jersey and longer tegmina of the same, when compared with material from the interior pine-land of the State, a point to which we have already called attention,<sup>70</sup> loses some of its apparent significance when the large series from that State now available are considered. The tegminal length is now known to be individually variable in both the pine-land and beach specimens. Southward the difference between the strand and more interior material is less pronounced than in New Jersey, although the largest individuals from a general region are, as a rule, from the beaches. This is not invariable, as Winter Park, North Carolina; Yemassee, South Carolina; Isle of Hope and Brunswick, Georgia, and Jacksonville, Florida, all localities removed from the strand proper, are represented by very large individuals. The Isle of Palms specimens, which are from typical strand situations, are of but average size.

Measurements (in millimeters) of extremes of the series here examined are as follows:

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂ Ashley Junction, S. C. ( <i>alutacea</i> ).....	28.2	6.1	24.3	17.
♂ Brunswick, Ga. ( <i>rubiginosa</i> ).....	28.3	6.7	25.5	16.1
♂ Albany, Ga. ( <i>alutacea</i> ).....	27.5	6.	25.5	16.5
♂ Tybee Island, Ga. ( <i>rubiginosa</i> ).....	36.2	8.4	32.	19.4
♂ Billy's Island, Ga. ( <i>rubiginosa</i> ).....	36.	7.9	32.5	19.8

<sup>70</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 293, (1907).

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂ Atlantic Beach, Fla. ( <i>rubiginosa</i> ).....	39.3	8.5	32.8	20.5
♀ Winter Park, N. C. ( <i>rubiginosa</i> ).....	46.5	10.	35.	22.3
♀ Sandfly, Ga. ( <i>alutacea</i> ).....	47.2	9.2	35.6	23.
♀ Live Oak, Fla. ( <i>alutacea</i> ).....	45.	8.3	34.5	21.9
♀ Yemassee, S. C. ( <i>rubiginosa</i> ).....	50.6	11.2	40.3	25.9
♀ Atlantic Beach, Fla. ( <i>rubiginosa</i> ).....	60.8 (abdomen distended)	11.3	41.8	26.8
♀ Atlantic Beach, Fla. ( <i>rubiginosa</i> ).....	56.	11.1	43.8	25.8

The Atlantic Beach and Jacksonville series average large, the Ashley Junction series shows widely different extremes in size, but the average is medium, while the Yemassee, Winter Park, Wilmington and Brunswick representations are very variable individually in this respect. The Billy's Island specimens average large but vary greatly, particularly in the male sex. The Albany specimen is average, while the two Tybee individuals (♂) are very large.

In the southeastern States the range of this species does not extend above the fall line except where the insect has penetrated a short distance up a broad river valley or, in the western part of the States, has pushed in from the Mississippi valley drainage by way of the Tennessee valley.

The species was taken in a variety of habitats: in hammock and in marsh about edge of same (Atlantic Beach), also in pine woods at the same locality; in pine woods, both long- and short-leaf, (Jacksonville, Sandfly, Isle of Hope, Yemassee, Winter Park, Weldon, Ashley Junction and Albany); along the edge of short-leaf pine woods (Columbia); in marshy land on the edge of hammock (Homerville); in high bushes and "bracken" along edge of swamp (Suwannee Creek); in tidal marsh (Tybee Island); in high bushes on edge of swampy depression filled with gums (Wilmington); in high bushes along drain near pine woods (Augusta) and from dune vegetation, *i.e.*, bayberry, oak, briars and palmetto (Isle of Palms). By comparison of these data with the information given above on the phases in each series, evidence concerning the habitat association of the color forms can be obtained.

*Schistocerca serialis* (Thunberg).<sup>71</sup>

*Schistocerca americana* of authors.

<sup>71</sup> This name has already been discussed by Hebard, *Ent. News*, XXVI, p. 406, (1915).

*Virginia.*

Lynchburg, VII, 22, 1913, (R. & H.),  
1 ♂.

Petersburg, VII, 23, 1913, (R. & H.),  
2 ♂.

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.),  
1 ♀.

Winter Park, IX, 7, 1911, (R. & H.),  
1 ♂.

Wrightsville, IX, 7, 1911, (R. & H.),  
1 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂.

Manning, V, 27 and 30, 1914, (W.

Stone), 2 ♂, 1 ♀, [A. N. S. P.].

Isle of Palms, VIII, 15, 1913, (R.),  
1 juv. ♀.

Yemassee, IX, 4, 1911, (R. & H.), 4 ♂.

*Georgia.*

Clayton, 2,000-3,700 feet, VI, 1909,  
(W. T. Davis), 1 ♀.

Thompson's Mills, spring, (H. A.  
Allard), 1 ♀, [U. S. N. M.].

Buckhead, VIII, 2, 1913, (R. & H.), 1 ♂.

Macon, VII, 30-31, 1913, (R. & H.),  
1 ♂, 3 juv. ♀.

Albany, VIII, 1, 1913, (R. & H.), 1 ♀.

Billy's Island, V, 16, 1915, (H.), 1 ♂;

VI, 12, 1912, (J. C. Bradley), 3 ♂.

Jesup, IX, 1, 1911, (R. & H.), 1 ♀.

Isle of Hope, IX, 3, 1911, (R. & H.),  
1 ♂.

Tybee Island, IX, 2, 1911, (R. & H.),  
1 ♂, 2 ♀.

Savannah, VIII, 7, 1878, (Grote),  
1 ♀, [U. S. N. M.].

*Florida.*

Jacksonville, (T. J. Priddey), 2 ♂,

2 ♀, [Hebard Cln.]; IX, 3, 1911,  
(W. T. Davis), 1 ♀.

South Jacksonville, IX, 7, 1913, (W. T.  
Davis), 1 ♂, 1 ♀.

Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 1 ♀.

Drury, in 1775, described and figured this species as *Libell[ula] americanus*; *Ill. Nat. Hist.*, I, p. 128, Pl. XLIX, fig. 2, name in index. This is preoccupied by *Libellula americana* of Linnæus; *Syst. Nat.*, ed. X, p. 545, (1758). The next name to apply to Drury's *L. americanus* is *Gryllus serialis* of Thunberg; *Mém. Acad. Imp. Sci. St. Pétersbourg*, V, p. 241, (1815); described from St. Bartholomew, British West Indies, which name consequently must be used for this species.

The present series shows considerable variation in size and some in color, but both features are individual in this material. The three immature females from Macon are in different instars, the most developed having just started the ecdysis passing into the imagal condition. The species was also seen but not taken at Orange, Virginia, July 21, 1913.

This ubiquitous species occurred in a variety of habitats, more generally, however, in pine woods. At no point visited by us was it present in sufficient numbers to be an economic menace.

*Schistocerca damnifica damnifica* (Saussure).*Maryland.*

Great Falls, II, 26, 1905, (H. Barber),  
1 ♂, [U. S. N. M.].

Washington, D. C., IX, 1883, 1 ♂,  
[Hebard Cln.].

*Virginia.*

Glencarlyn, V, 6, 1903, (A. N. Caudell),  
1 ♂, [U. S. N. M.].

Virginia Beach, XI, 1907, (Hopkins),  
1 ♀, [U. S. N. M.].

*North Carolina.*

Tryon, IV, 29, (Fiske), 1 ♀, [U. S.  
N. M.].

*Georgia.*

Clayton 2,000 feet, V, 18-26, 1911,  
(J. C. Bradley), 1 ♂.

Gainesville, IV, 2, 1911, (J. C. Bradley),  
1 ♂.

The Clayton male is similar to the Gainesville and Atlanta specimens already commented upon by us.<sup>72</sup>

**Schistocerca damnifica calidior** Rehn and Hebard.

*North Carolina.*

Fayetteville, IX, 9, 1911, (R. & H.),  
2 ♂, 1 ♀.  
Wilmington, IX, 8, 1911, (R. & H.),  
1 ♂.  
Winter Park, IX, 7, 1911, (R. & H.),  
3 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂.  
Manning, V, 23, 1914, (W. Stone),  
1 ♂, [A. N. S. P.].  
Yemassee, IX, 4, 1911, (R. & H.), 7 ♂,  
4 ♀.

*Florida.*

Jacksonville, IV and VIII, 1885,  
(W. H. Ashmead), 2 ♀, [Hebard  
Cln.]; VIII, 25, 1911, (R. & H.),  
1 ♂; XI, 3, 1911, (W. T. Davis),  
2 ♂, 1 ♀.  
South Jacksonville, IX, 7 and 2S, 1913,  
(W. T. Davis), 2 ♂, 1 ♀.  
Fort George, Duval County, 1 ♂,  
[U. S. N. M.].  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 1 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.),  
2 ♂.  
Newberry, XI, 19, 1911, (W. T. Davis),  
1 ♂.  
Archer, III, 1882, 1 ♂, 1 ♀, [Hebard  
Cln.].

Daytona, XI, 11, 1911, 1 ♂, 1 ♀,  
[U. S. N. M.].  
Rockledge, II, 5, 1880, 1 ♀, [U. S.  
N. M.].

*Georgia.*

Tybee Island, IX, 2, 1911, (R. & H.),  
1 ♂.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
4 ♂.  
Sandfly, IX, 3, 1911, (R. & H.), 2 ♂.  
St. Catharine's Island, XI, 1878,  
(Grote), 1 ♂, 1 ♀, [U. S. N. M.].  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 3 ♂; IV, 22-V, 12, 1911,  
(J. C. Bradley), 1 ♂.  
Brunswick, VIII, 30, 1911, (H.),  
1 juv. ♂.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 1 ♂.  
Jesup, IX, 1, 1911, (R. & H.), 2 ♂,  
2 ♀; XII, 1906, (H.), 2 ♂, 1 ♀.  
Mixon's Hammock, Okefenokee  
Swamp, V, 16, 1915, (H.), 1 ♀.  
Billy's Island, V, 28-VI, 2, VII, 1912,  
(J. C. Bradley), 2 ♀.  
Suwannee Creek, VIII, 2S, 1911,  
(R. & H.), 1 ♂.  
De Witt, IV, 23, 1912, 1 ♀, [Ga.  
State Cln.].  
Bainbridge, IX, 17-X, 19, 1910,  
(J. C. Bradley), 1 ♂.

The majority of the above records have been quoted as bare localities under the description of the race.<sup>73</sup>

As previously stated, material from Raleigh, North Carolina, and Atlanta, Georgia, is true *damnifica* with a tendency toward *d. calidior*, while individuals from the region about Wilmington and Fayetteville, North Carolina, and Florence, South Carolina, while representing *d. calidior*, show decided tendencies toward the northern form. Specimens from Chester and Albany, Georgia, are not fully typical of *calidior*, although decidedly nearer it than *d. damnifica*.

From the evidence in hand, this species, both typical and the race *calidior*, occurs two-brooded throughout the greater portion of its range, as material before us from New Jersey localities extends in dates from April to mid-November, while we have it taken every month in the year in southern Georgia. The material from Fayette-

<sup>72</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, pp. 261, 262, (1912).

<sup>73</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, pp. 261, 262, (1912).

ville, North Carolina, taken September 9, was recorded in our field notes as recently moulted, while the single specimen taken at Brunswick, Georgia, on August 30, is not quite mature.

The species occurred in pine woods among the wire-grass and other dry carpeting vegetation (Jacksonville and Live Oak), in mixed oak and pine woods (Winter Park), on sandy knolls and slopes with scattered pines and low oaks (Yemassee), in brushy clearings (Suwannee Creek) and in palmetto flats (Brunswick).

***Gymnoscirtetes pusillus* Scudder.**

*Georgia.*

Jesup, IX, 1, 1911, (R. & H.), 6 ♂, 8 ♀, 2 juv. ♂, 3 juv. ♀.  
Brunswick, VIII, 30, 1911, (H.), 6 ♂, 5 ♀.  
Hebardville, V, 15, 1915, (H.), 1 juv. ♂, 2 juv. ♀.  
Suwannee Creek, VIII, 28, 1911, (R. & H.), 20 ♂, 18 ♀, 2 juv. ♂, 6 juv. ♀.  
Homerville, VIII, 27, 1913, (R. & H.), 23 ♂, 28 ♀, 2 juv. ♂, 3 juv. ♀.

Chase Prairie, Okefenokee Swamp, IX, 5, 1913, (J. C. Bradley), 1 ♀.  
Billy's Island, VI, 1912, (J. C. Bradley), 1 ♂, 1 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.), 15 ♂, 15 ♀.  
Atlantic Beach, VIII, 24, 1911, (R. & H.), 3 ♂, 6 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.), 3 ♂.

The female specimens from Atlantic Beach are exceptionally large, the series from that locality measures in length as follows: males, 14. to 14.8 mm., females, 20.2 to 22.6 mm. The rest of the very large series here recorded shows no unusual variation in size or other characters. In length the males measure from 12.5 to 16. mm., females from 17.3 to 19.4 mm.

The larger series listed above were captured by beating, and with little difficulty, as in southeastern Georgia and northeastern Florida the species is frequently exceedingly plentiful, locally in the heavier undergrowth of the long-leaf pine forests (Jesup, Hebardville, Jacksonville), in like surroundings everywhere where the ground is very low (Suwannee Creek, Homerville). It was also found fairly abundant in wire-grass and other low plants on palmetto flats (Brunswick).

The known northern boundaries of the present species are considerably extended by the above records; in Florida it is known from as far south as Lakeland and as far west as De Funiak Springs.

***Campylacantha olivacea* Scudder.**

Macon, Georgia, VII, 31, 1913, (R. & H.), 1 ♂, 14 juv. ♂, 11 juv. ♀.

The previous most eastern records for this species are Fayetteville and Van Buren, in northwestern Arkansas. The intrusion of this essentially Sonoran genus as far east as central Georgia is of peculiar interest. The present species will probably be found at numerous



localities between those given above, when the intervening territory is carefully investigated.

This insect was found occasional everywhere in the thick grasses and weeds along the edge of the woods at the Idle Hour Club, a few miles outside of Macon. Vigorous and long-continued search for adults resulted in the taking of a single mature male, still soft from its last moult, and a considerable series of immature examples. These latter could be readily distinguished from other Locustid young by their striking whitish antennæ annulate with dark brown; these colors have greatly faded in the dried specimens.

***Eotettix signatus* Seudder.**

Jacksonville, Florida, VIII, 25, 1911, (R. & H.), 1 ♂.

Atlantic Beach, Fla., VIII, 24, 1911, (R. & H.), 12 ♂, 10 ♀.

Pablo Beach, Fla., IX, 5, 1913, (W. T. Davis), 1 ♂.

The specimens recorded above from Atlantic Beach are very large, their length measuring as follows: males, 18.8 to 21.4 mm.; females, 27. to 30.6 mm. Specimens of this species from southern Florida show that an extreme reduction in size southward is to be found in this insect.<sup>74</sup>

The species was found at Atlantic Beach to be moderately numerous in marshy land on the edge of a "hammock," where high saw-grass and reeds mingled with much low green marsh vegetation and occasional cypress shoots. It is known from the above localities southward to Lakeland and Homestead, Florida.

***Eotettix pusillus* Morse.**

*North Carolina.*

Fayetteville, IX, 9, 1911, (H.), 2 ♂, 4 ♀.

*South Carolina.*

Florence, IX, 6, 1911, (H.), 1 ♀.

Yemassee, IX, 4, 1911, (H.), 1 ♂, 1 ♀, 2 juv. ♀.

*Georgia.*

Warm Springs, 1,000 feet, VIII, 9-10, 1913, (R.), 1 ♂.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♀.

Spring Creek, VII-VIII, 1912-13, (J. C. Bradley), 2 ♂, 1 ♀, 1 juv. ♀.

Hebardville, V, 15, 1915, (H.), 2 ♂, 2 juv. ♂, 2 juv. ♀.

Homerville, VIII, 27, 1911, (H.), 1 ♂.

*Florida.*

Live Oak, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀.

The present singularly striking insect is distinguished by its compact and abbreviate form, with short pronotum, the dorsum of which is distinctly convex in longitudinal aspect, and by its distinctive coloration; this latter is due to a peculiar metallic sheen which suffuses the entire insect and is particularly striking in life.

All of the immature specimens before us have the median carina

<sup>74</sup> See Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1914, p. 396, (1914).

of the dorsum of the pronotum more strongly raised and arcuate than in the adults.

The immature examples before us range in size from a very early stage of development to the instar preceding maturity. These specimens are very singularly colored, being blackish overlaid with mars orange, the latter color forming a pale stripe on the post-ocular portion of the head and strongly indicated over the face and the constricted distal portion of the caudal femora. One of these specimens, which has apparently best retained its coloration, has the face nopal red. In life these specimens have a striking metallic, velvety lustre, which in the dried examples is still weakly indicated.

A very slight increase in size southward in individuals of the species is shown by the present series. Females from Fayetteville are among the smallest before us (length 15.5 to 16. mm.), while the specimen of that sex from Live Oak is the largest (length 20. mm.). In the series from Spring Creek the female is rather large, but the males are as small as any in the present series (length 10. to 11. mm.). The majority of specimens of this species have the abdomen decidedly upcurved, which makes the measurement for the insects shorter than would otherwise be the case.

We have noticed that this species is rather sluggish in its actions and was found to cling tenaciously to the stems of wire-grass, for which plant it showed a decided preference. The species was found in this wire-grass in short-leaf pine and oak woods (Fayetteville, Florence, Yemassee, Warm Springs), and in the same plant in moist but not swampy places in long-leaf pine woods (Albany, Hebardville, Homerville, Live Oak), at the latter locality being found also in wire-grass and oak sprouts on the sides of a sink which apparently had been recently deforested. The six specimens taken at Fayetteville, after long and diligent search in a restricted area, constitute the only series from a single locality we have yet been able to secure of this rare insect, which was previously known only from Denmark, South Carolina, and Waycross and Thomasville, Georgia. It is interesting to note that its range is not confined to the coastal plain and that it has not been found within the range of *E. signatus*.

***Hesperotettix floridensis* Morse.**

Georgia.  
Augusta, VII, 29, 1913, (R. & H.),  
1 ♂, 1 ♀, 1 juv. ♀.  
Warm Springs, VIII, 9, 1913, (R.), 1 ♀.

Suwannee Creek, VIII, 28, 1911,  
(R. & H.), 4 ♂, 1 ♀.  
Homerville, VIII, 27, 1911, (R.), 1 ♂.

The present insect is much more nearly related to *H. speciosus*

than to any other species of the genus, the most striking difference in this insect being the abbreviate, rotundate tegmina.

Little variation is shown by the above series of this very rare insect. In coloration the adults from Augusta and Warm Springs differ from the others in having the median carina of the pronotum outlined in pompeian red.

This species acts in an unusual manner when pursued, hiding on the underside of the leaves of small plants, with only feet, antennæ and eyes showing from above. It was taken among low plants, huckleberry, strawberry and many other varieties, in a sandy scrub-oak area just above the fall line (Augusta), in heavy tangled undergrowth of pine and oak woods (Warm Springs), on low open land covered with wire-grass and many low bushes and saw palmettoes on the edge of high bushes and bracken along the border of the Okefenokee Swamp (Suwannee Creek) and in a very similar situation to the last, where, however, a heather-like plant, *Kalmia hirsuta*, was predominant (Homerville). The discovery of this insect just above the fall line at Augusta and on the Piedmont plateau at Warm Springs was rather surprising, as it was hitherto known only from Waycross, Georgia, and Pablo Beach, San Pablo and Hastings, Florida.

***Hesperotettix brevipennis brevipennis* (Thomas).**

Arlington, Virginia, VII, 9, 1914, (H.; asleep at night in *Andropogon* sp.), 1 ♀.  
Currahee Mountain, Georgia, 1,200 to 1,700 feet, VIII, 5, 1913, (H.), 5 ♂, 4 ♀.

Occasional specimens of this species were found from the edge of the pine woods on the upper portion of the lower gradual slopes of Currahee Mountain, to its summit. The specimens were taken in bunch-grass, *Cyperus* sp., particularly where this was plentiful on open slopes, and in the luxuriant mountain undergrowth of grasses, vines and oak sprouts, under a low forest, predominant in black-jack oak.

In the southeastern United States this species was previously known only from Sand Mountain, Georgia, and Lookout and Chehawhaw Mountain and its vicinity in Alabama.

***Hesperotettix brevipennis pratensis* (Sudder).**

Live Oak, Florida, VIII, 26, 1911, (R. & H.), 1 ♂, 3 ♀.

It seems impossible to consider this insect other than a western geographic race of *H. brevipennis*. Material from the type locality, Dallas, Texas, shows hardly any structural differences outside of wing length, and the present series is nearly intermediate between such specimens and typical *brevipennis*. Such intermediates were found and

so recorded by Morse from Magazine Mountain, Arkansas.<sup>75</sup> The tegminal length of the present series of intermediates is as follows: male, 12.; females, 12.5 to 12.7 mm. For the series of *H. brevipennis* s.s. from Currahee Mountain, Georgia, the tegminal length is: males, 8.4 to 9.8; females, 10 to 11.3 mm.

The present insect is known to be distributed eastward along the Gulf Coast as far as Live Oak, Florida, though from the country intervening between coast and mountains in Georgia and Alabama the species has not been recorded, while in the southern mountains typical *H. brevipennis* is found to intergrade with the present race far to the westward of this longitude. The very local nature of its distribution, and the scarcity of the species in the east, creates considerable difficulty when efforts to define its exact range are made. One of the specimens recorded above was taken on sandy soil among wire-grass and other low plants, the three others were found in a somewhat similar environment, but in small clumps of oaks about two feet in height on the border of a sink.

**Paratytopidia beutenmuelleri** Morse.

We have before us two topotypic females of this remarkable insect, taken by W. Beutenmüller near Black Mountain, North Carolina, July, 1912. These specimens are in the Davis Collection and that of the Academy of Natural Sciences of Philadelphia.

*The Gracilis Group of the Genus Melanoplus.*

We find that *M. gracilis*, *sylvaticus*, *similis*, *viridipes* and *deceptus* form a group in the present genus which may be termed the Gracilis Group, the species in relationship following the order given above, of which *gracilis* is more widely separated from the others than they are from each other.

Scudder's placing of *gracilis* in his Plebejus Series and *viridipes* in his Inornatus Series is wholly illogical.

**Melanoplus similis** Morse.

Bluemont, Virginia, VII, 1, 1914, (J. D. Rabun Bald, Rabun County, Ga., VII, Hood), 1 ♀, [Hebard Cn.], 1910, (W. T. Davis), 1 ♂.
Clayton, Rabun County, Georgia, VI, Tuckoluge Creek, Rabun County, Ga., 1909, (W. T. Davis), 1 ♂, 1 ♀. VI, 1909, (W. T. Davis), 2 ♀.

The present specimens agree very well with Morse's description, the cerci are slightly more slender than in the drawing given by that author.<sup>76</sup> One of the females taken on Tuckoluge Creek was found in a bush.

<sup>75</sup> Carnegie Inst. Wash., Publ. No. 68, p. 45, (1907).

<sup>76</sup> Carnegie Inst. Wash., Publ. No. 18, p. 46, fig. 6, (1904).

**Melanoplus viridipes** Scudder.

1897. *Melanoplus juvenus* Scudder, Proc. Amer. Philos. Soc., XXXVI, p. 14. Proc. U. S. Nat. Mus., XX, pp. 129, 266, Pl. XVIII, fig. 1. [No locality for described type.<sup>77</sup>]

The above synonymy is due to a most unusual confusion of material. Scudder, apparently by accident, placed a specimen of *M. viridipes* without data in his series of *M. puer*. Later, finding it to be different from that species, he had the specimen figured and described it as *M. juvenus*. This specimen is now in the Scudder collection, marked Scudder's type *M. juvenus* and "drawn"; it has been selected as the single type, for it is the specimen which furnished the original description and figure of *juvenus*. It was necessary to select a single type, for although, with the description Scudder figured and described but one specimen, he derived the data given there, "Fort Reed, Orange County, Florida, April 8; Comstock," from another male specimen of the type series of *M. puer*, which specimen he also marked Scudder's type *M. juvenus*. His work was apparently done carelessly and at different times, other explanation for such an occurrence being incomprehensible.

**Melanoplus deceptus** Morse.

Black Mountain, North Carolina, VI, Clayton, Rabun County, Georgia, VI,  
1912, (W. Beutenmüller), 2 ♂, 3 ♀, 1909, (W. T. Davis), 1 ♂.  
[Davis Chn.].

*The Decorus Group of the Genus Melanoplus.*

Five-species of this group are found in the Sabalian or Basic Austral zone of the southeastern United States, which are all closely related and are among the more formative elements of the plastic genus *Melanoplus*. No intergradation between the forms is shown by the material before us, but in every large series a certain slight amount of variation often gives evidence of the derivation of the members of the group. It is our opinion that five valid species exist in the known material of the group and that no geographic races are represented.

Of these five species Scudder placed *decorus* in his Inornatus Series, and *attenuatus* in his Fasciatus Series, both of which series are anomalous aggregations of widely separated forms. The senior author in describing *hebardii* placed it in the genus *Eotettix*, since Scudder chiefly separated that genus from *Melanoplus* by the male subgenital plate having a distinct subapical tubercle and the pronotum having the median carina well developed and percurrent.

<sup>77</sup> This specimen has been fixed as single type by the present authors, PROC. ACAD. NAT. SCI. PHILA., 1912, p. 84, (1912).



These characters apply as well to the species of the Decorus Group as they do to the genus *Eotettix*, which genus is, however, valid, as it possesses other excellent characters. Morse correctly placed *australis* beside *attenuatus*, and the fifth species was hitherto undescribed. Morse states that *M. decoratus* is closely related to *M. decorus* and compares the two species in his original description; in reality the two species belong to very distinct groups.

The following analysis gives the important characters, found principally in the male genitalia, of the present group.

*Important Color Characters.*—The post-ocular fuscous stripe is usually strongly, sometimes weakly continued, but always present on the metazona in *decorus*, in the other species this stripe stops abruptly at the principal sulcus. In the male sex of *australis* it is very infrequently interrupted on the prozona by narrow oblique fasciæ of the general color of the insect,<sup>78</sup> this species is the only one of the group which has the sides of the abdomen wholly immaculate. In *nubilus* the males have the dark markings on the sides of the abdomen very large and the dorsum of the abdomen very dark.

*Furcula.*—(Figured for all the species.) In *decorus* normally widely divergent, slender, evenly tapering, acuminate and slightly over one-third as long as supra-anal plate; in *australis* broad at base, tapering to slender digitate tips which are due chiefly to an abrupt mesal shoulder on the inner margins, one-third as long as supra-anal plate and weakly divergent; in *attenuatus* weakly divergent, slender, evenly tapering, acuminate and scarcely one-fourth as long as supra-anal plate; in *hebardii* small knob-like plates with divergent angulate apices, scarcely one-fifth as long as supra-anal plate; in *nubilus* usually subparallel, scarcely tapering but very slender fingers, less than one-third as long as the short supra-anal plate.

*Supra-anal Plate.*—(Figured for all the species.) In *decorus* and *australis* elongate, shield-shaped with sides meso-distad evenly convex, the narrow percurrent median sulcus lying between sharp but not high walls in the proximal portion of the plate, beyond which are a pair of more distant, short, blunt ridges, which are evenly convergent and almost join near the apex in *decorus* and at the apex of the plate in *australis*, near the base of the plate on each margin are very weak indications of a marginal plication. This plate is of similar general structure in the other species, but shows the following

<sup>78</sup> Females of *australis* have this interruption almost always present, in some specimens it is very pronounced, leaving only traces of a fuscous band; such an interruption is also found in this sex of *M. nubilus*.

striking differences: in *attenuatus* not as long, with sides in more than distal half straight convergent, the distal ridges are weakly convergent distad, while the marginal plications near the base of the plate are developed into heavy, broadly rounded, dentate folds, which are very striking; in *hebardei* the plate is elongate with sides in more than distal half straight convergent, its surface very decidedly flattened with median sulcus less pronounced and the distal convergent ridges subobsolete, the marginal plications near the base of the plate are, however, developed into heavy knobs not as decided as in the preceding species, but still prominent; in *nubilus* the plate is decidedly shorter, with the distal ridges subparallel, the other characters as given for the first two species of the group similar, but all somewhat intensified.

*Cercus*.—(Figured for all the species.) In *decorus* composed of a moderately broad, rapidly tapering, slightly tumid basal portion, about one-third of the whole, and a very slender, subequal, gently arcuate, incurved and apically faintly expanding portion, hardly more than a third as broad as the base, with apex slightly expanded, broadly rounded dorsad and slightly produced, more narrowly rounded ventrad, reaching a little beyond the apex of the supra-anal plate. In the other species the cerci are in general similar, but differ in the following respects: in *australis* with apex very slightly broader, spatulate, roundly symmetrical, sometimes very slightly emarginate; in *attenuatus* with apex a little more than half as broad as base, expanding ventrad more than dorsad, the distal margin distinctly emarginate mesad so that the apex appears faintly bifid, reaching the tip of the supra-anal plate; in *hebardei* and *nubilus* the cercus shows this latter condition and at the apex is weakly but distinctly bifid, in *hebardei* the emargination of the distal margin being ventral, the apex not quite reaching the apex of the supra-anal plate. In *nubilus* this specialization is further continued in the dorsal lobe of the apex of the cercus being apically flattened, thus giving the apex of the cercus in this insect an almost trifid appearance.

*Subgenital Plate*.—In all of the species small, greatly tapering so as to be very narrow at the tip. In *decorus* the apex is strongly but delicately tuberculate; the other species have the apical margin well rounded and the plate faintly and broadly tuberculate subapically, this tuberculation somewhat more decided in *nubilus* than in any other of the latter species.

We have not discussed the tegmina, for in every large series of

these species they are found to vary in size, width, separation and truncation, though always having their apices rounded.

**Melanoplus decorus** Scudder. Pl. XIII, figs. 1, 2.

Wilmington, North Carolina, IX, 8, 1911, (R. & H.), 48 ♂, 17 ♀.

Winter Park, N. C., IX, 7, 1911, (R. & H.), 20 ♂, 12 ♀.

Lake Waccamaw, N. C., IX, 8, 1911, (R. & H.), 26 ♂, 8 ♀.

The large series before us shows no striking size or structural variation, adhering closely to the characters given in the above analysis. The four males previously recorded by the authors from Newbern, North Carolina, have the furcula somewhat broader in varying degrees, and in two specimens considerably less divergent than in the types or in the present series; they are otherwise perfectly typical.

In coloration individuals range from empire yellow through all shades of that color to medal bronze, the females showing more variation than the males which are usually more brightly colored. A very few melanistic females are before us, in which specimens the general coloration is bone brown much suffused with black. In all of the specimens the post-ocular fuscous stripe is present on the metazona, it is very pronounced in nearly all of the males, but in some specimens of this sex and in numerous females it is much weaker than on the prozona. The blackish coloration of the tubercle of the subgenital plate of the male is confined to its dorsal surface. In life the species is very brilliantly and strikingly colored, but, as in the other species of this delicately colored group, the dried specimens have the yellow tones much faded and discolored in the majority of specimens. A great similarity to the brilliantly colored individuals of *Paroxya atlantica* from this region was noted.

No great size variation is found in the material before us, the extremes in length being as follows: males 17. to 20., females 20.5 to 25.3 mm.

The species was found very locally distributed in low plants and scant grasses about a swampy depression in pine woods in which were a few black gum trees (Winter Park), in heavy undergrowth of almost swampy pine woods (Lake Waccamaw) and common in the wet mucky border of a swampy tract which was covered thickly with grasses, bog plants, such as pitcher-plants and venus' fly-traps, and dotted with low bushes (Wilmington).

Outside the above localities the species is known only from Pungo Bluff and Newbern, North Carolina.

**Melanoplus australis** Morse. Pl. XIII, figs. 3, 4.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 54 ♂, 6 ♀.

Sandfly, Georgia, IX, 3, 1911, (R. & H.), 65 ♂, 43 ♀.

Isle of Hope, Ga., IX, 3, 1911, (R. & H.), 41 ♂, 4 juv. ♀.

The large series of the present species shows no striking structural variation. The insect is larger and more attenuate than *M. decorus* and probably very similar to *M. attenuatus* in this respect. The extremes in length in the present series are as follows: males 16.4 to 22., females 23. to 27. mm. The males average in length about 19. mm.

In coloration individuals range from lemon chrome, frequently suffused with greenish or orange, to army brown, usually showing traces of a yellowish suffusion. The species is the most brilliantly colored of the group, individuals in life being very striking. The distinctive differences in color pattern are discussed in the analysis of the group.

It was noted at Sandfly that the very brightly colored, yellow or greenish yellow, individuals were taken on green plants, while the dull yellow or brownish specimens were found among the yellowing and brown fronds of the bracken. The males were active, but not alert and were easy to capture; the females were much less active and were usually met with in the heavier undergrowth where much greater concealment was afforded. Females from Isle of Hope are represented by four immature individuals only, indicating that adults of the species had been present but a very short time.

The species was found not unusual through the low bushes, grasses and low swamp-loving plants on low wet ground through the short-leaf pine woods (Yemassee), very common in tall, rank, succulent undergrowth in somewhat swampy gray-bark pine woods (Sandfly, Isle of Hope); at the latter locality it was particularly numerous in patches of yellow and brown bracken.

The species was previously known from the single type specimen, a male from Savannah, Georgia.

**Melanoplus attenuatus** Scudder. Pl. XIII, figs. 5, 6.

Sullivan Island, South Carolina, IX, 5, Ashley Junction, S. C., VIII, 15, 1913, 1911, (R. & H.), 1 ♂, (R.), 3 juv. ♂, 3 juv. ♀.

Magnolia, Charleston County, S. C., Augusta, Georgia, VII, 29, 1913, (R. & H.), 3 juv. ♂, 1 juv. ♀.

The striking dentate plications on each side of the supra-anal plate near its base, are more pronounced in the specimen from Sullivan Island than in those from Magnolia. The extremes in length in the adult males before us are 18.5 and 20.6 mm.

In general coloration the insects are empire yellow much suffused

with brown. The post-ocular fuscous stripe is as heavy on the prozona as in the most decidedly marked males of the series of *M. australis* before us.

A single specimen was found on the somewhat marshy, sandy ground covered with low vegetation (Sullivan Island), but the species was found fairly numerous in moist places in the pine woods in the low heavy undergrowth of plants and scrub oaks less than a foot in height (Magnolia). A thunder storm prevented the accumulation of a large series at the latter locality. In mid-August the young alone were to be found in a depression overgrown with tall grasses in long-leaf pine woods (Ashley Junction), and in late July a few small young were found in short grasses in a somewhat swampy spot in similar woods of the flat country just below the fall line (Augusta).

The species was previously known from the three male type specimens from Smithville, at the mouth of the Cape Fear River, in extreme southeastern North Carolina, and from one male and three young from Denmark, South Carolina.

**Melanoplus hebardii** (Rehn). Pl. XIII, figs. 7, 8.

1906. *Eolettix hebardii*, Ent. News, XVII, p. 234. [Tyty Plantation, Thomas County, Georgia.]

Albany, Georgia, VIII, 1, 1913, (R. & H.), 2 juv. ♂, 2 juv. ♀.

The most important characters which separate this species from the others of the present group are given in the preceding analysis. The figures of the genitalia, which accompany the original description, are faulty and misleading. The type, which is 22 mm. in length, is as large as the largest male of *M. australis*, which species averages considerably less than this measurement. The type of the present species remains the unique adult.

The above series of about half-grown young was taken in the heavy undergrowth of the long-leaf pine forest along the Flint River.

**Melanoplus nubilus** new species. Pl. XII, fig. 11; pl. XIII, figs. 9, 10.

More closely related to *M. australis*, *attenuatus* and *hebardii* than to *M. decorus*, differing decidedly in the characters given in the analysis on pages 212 to 215. Females are scarcely separable from dark females of *M. decorus*, though the males show wide differences in the two species.

TYPE: ♂; Fayetteville, Cumberland County, North Carolina. September 9, 1911. (Rehn and Hebard.) [Hebard Collection, Type No. 107.]



*Description of Type*.—Size smaller than in *M. attenuatus*; form slightly more attenuate, with pronotum less ample and head slightly more prominent. Tegmina abbreviate, rotundate.<sup>79</sup> The important genital characters, of which the form of the supra-anal plate (fig. 9) and cercus (fig. 10) are the most decided, are given in the preceding analysis, while the abdominal coloration, also given there, is distinctive in this sex.

*Allotype*: ♀. Same data as the type. [Hebard Collection.]

*Description of Allotype*.—The vertex is found to be less depressed mesad and the facial costa still more weakly sulcate than in females of *M. decorus*, while the dorsum of the pronotum narrows even less than in that species and has, in consequence, the cephalic and caudal width nearly subequal.

The usual variation found in the two species, however, makes it often impossible to separate females by the above characters, and we are obliged to admit that we are unable to find definite differential characters for females of the two species.

*Measurements (in millimeters).*

	♂ ♂		♀ ♀	
	TYPE.	Paratypes.	Allotype.	Paratypes.
Length of body.....	16	15.8–16.8	24.7	21.2–25*
Length of pronotum.....	3.8	3.7– 4.1	4.9	4.9– 5.3
Length of tegmen.....	2.9	2.6– 3.8	4.4	3.8– 4.5
Greatest width of same.....	2	1.8– 2.4	2.8	2.6– 3
Length of caudal femur.....	9.9	9.3–10.1	13	12.4–13.1
Greatest width of same.....	2.2	2.2– 2.4	2.8	2.7– 3

The furcula of the present insect vary somewhat from the normal regular and parallel form to one in which the sides are less regular and the fingers divergent, the cerci also show some individual variation, two of the males have the ventral expansion of the tip of the cercus decidedly produced and sharply acute-angulate.

In coloration the series of specimens before us is quite uniform, much resembling dark individuals of *M. decorus*, except that the post-ocular fuscous stripe is abruptly terminated on the lateral lobes of the pronotum at the principal sulcus and the males have the dark markings on the sides of the abdomen much more pronounced with the dorsum of the same very dark. Half of the females have the post-ocular fuscous stripe on the prozona interrupted by narrow oblique pale fasciæ as in *M. australis*. The dark males have a

<sup>79</sup> The tegmina show almost as much individual variation in this species as in the others of this group.

lacquered appearance in which a brownish and greenish suffusion is apparent, the females range in general coloration from pecan brown to warm sepia with markings of a darker shade.

All of the material before us was taken in short-leaf pine woods around a mill pond at Fayetteville, North Carolina. The males were occasional in gall-berry and other bushes and were found usually two or three feet from the ground, "sitting up warily or jumping away," while the females were decidedly less abundant and less active and by hiding sometimes eluded pursuit.

*Specimens Examined*.—20; 13 males, 6 females and 1 immature female.

Fayetteville, Cumberland County, North Carolina, IX, 9, 1911, (R. & H.), 13 ♂, 6 ♀, 1 juv. ♀, TYPE, *allotype* and paratypes.

*The Tribulus Group of the Genus Melanoplus.*

The present group contains *M. obovatipennis*, *morsei*, *tepidus*, *tribulus*, *tribuloides*, *devius* and *decoratus*; the species in relationship following the order given above, of which the first three species are very closely related, the next three likewise, while the last species is the most aberrant of the group. Scudder placed *obovatipennis* in his anomalous Fasciatus Series, the relationships of the other species, which are all more recent in description, have been correctly though indefinitely given with the descriptions of the same, excepting *M. decoratus*, which species Morse considered more nearly related to *M. decorus*.

**Melanoplus tribulus** Morse.

*Pennsylvania.*

Pink Hill, Newtown Square, VI, 19, 1908, (R.), 1 ♂; VII, 15, 1911, (H.), 1 ♀.

*Maryland.*

Beltsville, VII, 4, 1912, (J. D. Hood), 1 ♂, [Hebard Cln.].  
Plummer's Island, IX, 30, 1906, (A. K. Fisher), 1 ♀, [U. S. N. M.].

*Virginia.*

Green Dell Farm near Pohick, VIII, 25, 1912, (A. N. Caudell), 1 ♂, [U. S. N. M.].

*North Carolina.*

Weldon, VII, 24, 1913, (H.), 1 ♂.

*Georgia.*

Clayton, VI, 1909, (W. T. Davis), 1 ♂.  
Rabun County, VII, 1910, (W. T. Davis), 1 ♀.  
Toccoa, VIII, 4-5, 1913, (H.), 1 juv. ♂.  
Dalton, VIII, 7, 1913, (R.), 1 juv. ♂, 1 juv. ♀.  
Jasper, VIII, 5, 1913, (R.), 1 juv. ♂.  
Sharp Mountain, VIII, 6, 1913, (R.), 3 ♂, 1 juv. ♀.  
Buckhead, VIII, 2, 1913, (R. & H.), 2 juv. ♂, 1 juv. ♀.  
Vicinity of Stone Mountain, VIII, 3, 1913, (H.), 1 juv. ♀.  
Lost Mountain, Cobb County, VII, 13, 1913, (J. C. Bradley), 1 ♀.

Males of this insect are almost inseparable from males of *M. devius*, for the characters which Morse gives in his original descriptions do not hold. Females of the present species, however, differ greatly

from females of *devius* in being less robust, with narrower vertex of the fastigium and narrower ovipositor jaws, and in having the lateral lobes of the pronotum less deep and the post-ocular fuscous stripe there pronounced, narrow and sharply defined from the pale ventral portion of the lateral lobes.

The males and young recorded above from Georgia could not be assigned to this species were it not quite certain that *M. devius* is found in Georgia only at the highest elevations in the Appalachians.

Specimens before us from New York, New Jersey and Pennsylvania are rather small and the males have the subgenital plate and preceding ventral abdominal segments wholly immaculate; this coloration is found in but a single southern male which is from Clayton, Georgia.

The northernmost specimens here recorded were taken along the edge of a deciduous forest adjacent to a barren serpentine outcrop (Pink Hill) and among low bushes on sandy soil (Beltsville). In Georgia the species was found very locally in the undergrowth of forests composed chiefly of deciduous trees, particularly on hillsides.

The species was previously known from Staten Island, New York, Stafford's Forge, New Jersey, and Sharptop Mountain, Georgia.

**Melanoplus devius** Morse.

Jefferson, North Carolina, VIII, 1907,	Spartanburg, South Carolina, VIII, 6,
(F. Sherman), 1 ♂, [U. S. N. M.].	1913, (H.), 1 ♀, 12 juv. ♂, 11 juv. ♀.
Charlotte, N. C., VII, 27, 1913, (R. &	Wilson's Gap, Mountain City, Georgia,
H.), 3 ♂, 13 juv. ♂, 13 juv. ♀.	VIII, 22, 1913, (J. C. Bradley), 1 ♀.

The difficulty of separating males of this species from those of *M. tribulus* is remarkable, considering that the females of the two are very different, in *devius* being more robust, with broader fastigium of the vertex and broader ovipositor jaws, with lateral lobes of the pronotum deeper and the post-ocular fuscous stripe not sharply outlined there, the lateral lobes being wholly infuscated with the dorsal portion broadly darkened.

The series from Charlotte and Spartanburg were found by careful search in local areas of the rather scant undergrowth of the heavy deciduous forest. The species was previously known from Wytheville, Virginia, and Tipton, Asheville and Mount Pisgah, North Carolina.

**Melanoplus decoratus** Morse.

Orange, Virginia, VII, 21, 1913, (R. &	Clayton, Georgia, VI, 1909, (W. T.
H.), 1 ♂, 5 ♀, 1 juv. ♂.	Davis), 1 ♂.
	Macon, Ga., VII, 31, 1913, (H.), 1 ♀.

The present insect may be readily separated from its allies by the very peculiar subgenital plate of the male, which has a greatly devel-

oped apical tubercle, and by the very strongly protuberant vertex in both sexes.

Adults of the insect were found scarce in the undergrowth of a heavy chesnut forest on Southwest Mountain (a hill near Orange), and among oak sprouts in a tangle of other plants and vines in pine woods (Macon). The above records extend the known range of the species both northward and southward.

*The Puer Group of the Genus Melanoplus.*

The following species belong to the present group, *M. puer*, *rotundipennis*, *stegocercus*, *mirus*, *scapularis* and *strumosus*. In all of these species both sexes have the prosternal spine prominent and very broad, flattened cylindric with apex transversely excised, the sides rounded; the caudal tibiae are glaucous, often more or less flavescent at base and tip, with spines black or black-tipped. The species are properly associated as listed above, no one of them shows very close affinity to any of the others, however, as each has one or several decided and unusual characters peculiar to itself.

Scudder's association of the then known species, *puer* and *rotundipennis*, is of no value, the situation in regard to the latter is discussed below. Morse, at the time he described *strumosus*, did not discuss its relationship.

**Melanoplus rotundipennis** Scudder.

1897. *Melanoplus inops* Scudder, Proc. Amer. Philos. Soc., XXXVI, p. 16; Proc. U. S. Nat. Mus., XX, pp. 130, 329. [Florida.]

*Georgia.*

Brunswick, VIII, 30, 1911, (H.), 2 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 9 ♂, 7 ♀, 1 juv. ♀.  
Suwannee Creek, VIII, 28, 1911, (R.),  
1 ♂.  
Billy's Island, V, 15, 1915, (H.), 1 ♂,  
3 juv. ♂, 2 juv. ♀; VI, VII, IX,  
1912-13, (J. C. Bradley), 7 ♂, 8 ♀,  
1 juv. ♀.  
Honey Island, VI, 1, 1912, (J. C. Brad-  
ley), 4 ♂, 4 ♀.

Thomasville, XI, 30, XII, 1, 1903,  
(H.), 2 ♀.  
Metcalfe, IX, 17, 1903, (for Hebard),  
1 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. &  
H.), 11 ♂, 6 ♀; IX, 7, 1913, XI, 5,  
1911, (W. T. Davis), 4 ♂.  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 2 ♂, 2 ♀.  
Live Oak, VIII, 26, 1911, (R. & H.)  
9 ♂, 9 ♀.

Examination of the types of *M. rotundipennis* and *M. inops* shows that the two are absolutely synonymous. The figures of the type of *inops* in Scudder's Revision are very poor, the furcula indeed being wholly overlooked; the figure of *rotundipennis* is, however, quite satisfactory, though the base of the cercus in lateral aspect is drawn much too wide.

Females of this species constitute the basis for Scudder's record

of *M. puer* from Jacksonville, Florida, in his Revision.<sup>80</sup> A series of sixty-nine specimens from northern Florida have been referred by the present authors to the synonymous *inops*, while the three females mentioned above from Thomasville and Metcalfe, Georgia, were unfortunately recorded by us as *M. sylvestris*,<sup>81</sup> females of which species may at once be roughly separated by their red caudal tibiae.

Scudder's placing of the present species is most unsatisfactory, as it is a development of the *M. puer* type; his opinion that the synonymous *inops* belonged to a widely different group demonstrates amply his own uncertainty in the matter.

A certain amount of size variation is appreciable, the series from the Okefenokee Swamp and Jacksonville averaging larger than the others.

*Measurements (in millimeters) of extremes.*

	Length of body.		Least width between tegmina.	
	♂ ♂	♀ ♀	♂ ♂	♀ ♀
Cumberland Island, Ga....	13.6-16.7	17.8-20.5	.6-1	1.4-1.9
Jacksonville, Fla.....	17-17.9	20.4-23.3	.8-1.1	1.1-1.7
Live Oak, Fla.....	14-16.1	18-20.3	.9-1	1.3-1.7

The greatest tegminal separation is shown in a Thomasville female, where the least intervening width is 2.4 mm.

The general coloration of the species varies from fuscous to orange cinnamon. All of the males have the dorsal portion of the lateral lobes of the pronotum shining black, but more than half of the females have this marking abruptly discontinued at the metazona. The caudal femora range from an immaculate type of coloration to one in which they are heavily twice banded with fuscous, the immaculate type being found more often in the males.

The species was found, usually locally distributed, in the undergrowth of the long-leaf pine woods, but was also sometimes met with in the undergrowth of mixed pine and oak woods (Live Oak), and on palmetto flats (Brunswick). As Morse has noted, the differences in general coloration of specimens were found to correspond with the color of the surrounding soil or dead leaves in which individuals were taken.

The present species has a very limited distribution, northward being known from Brunswick west to Thomasville in Georgia, and southward as far as Lakeland in central Florida, in which latitude it appears

<sup>80</sup> *Proc. U. S. Nat. Mus.*, XX, p. 253, (1898).

<sup>81</sup> *PROC. ACAD. NAT. SCI. PHILA.*, 1904, p. 791, (1905).



to be very scarce. From the latter region, southward on the mainland of peninsular Florida, *M. puer* replaces the present insect.

**Melanoplus stegocercus**<sup>82</sup> new species. Pl. XII, fig. 12; pl. XIII, figs. 11, 12, 13.

Related to *M. rotundipennis*, but differing very greatly in the male genitalia. The female sex is unknown.

TYPE: ♂; Cannoche River at Groveland, Bryan County, Georgia. July 28, 1913. (J. C. Bradley.) [Acad. Nat. Sci. Phila., Type No. 5273.]

*Description of Type.*—Size and form similar to *M. scapularis*, but somewhat heavier; cephalic and median femora somewhat swollen as in *M. rotundipennis*, and with dorsum of pronotum having the lateral carinæ weakly and regularly diverging caudad as in that species. Tegmina similar to those of *scapularis*, but not attinent (least width between same 1 mm.). Extremity of abdomen broadly and decidedly produced, tumid, but not at all upcurved; supra-anal plate much as in *scapularis*, but with angles of lateral margins less distal, furcula likewise absent (fig. 11); cerci broad at base, thence expanding evenly to the truncate distal margin, dorsal margin weakly arcuate to the scarcely evident disto-dorsal angle, ventral margin straight to the sharply rounded subrectangulate disto-ventral angle, the cercal shafts regularly flexed so that the disto-dorsal portion of the cerci is horizontal (though its surface is swollen and uneven), and the margins of the same when in normal position overlap in this plane dorsad of the distal portion of the supra-anal plate (pl. XIII, fig. 12); disto-ventral abdominal segment with caudal margin very weakly produced mesad, subgenital plate roundly and rather broadly produced (length 2 mm.), with proximal lateral portions of plate and adjacent portion of preceding segment subcompressed, extending beyond the apex of the supra-anal plate one-half the length of the same (fig. 13). The soft integument between the supra-anal and subgenital plates is almost wholly covered by the distal portions of the cerci and does not rise above the dorsal margin of the subgenital plate.

*Measurements (in millimeters) of TYPE.*

Length of body.....	17.5	Greatest width of tegmen.....	2.4
Length of pronotum.....	3.9	Length of caudal femur.....	11.1
Length of tegmen.....	3.1	Greatest width of caudal femur...	3.1

The specimen is larger than the type of *scapularis*, but not as much so as the body length would lead one to believe, the uncurved

<sup>82</sup> From *στέγω*, to cover closely, and *κέρκος*; *cercus*. In allusion to the remarkable cerci, which cover closely the caudal portion of the supra-anal plate.

abdominal extremity adding to the length measurement of the present insect.

In coloration the specimen closely resembles the more brilliantly colored males of *rotundipennis* and has the caudal femora heavily twice banded with fuscous. The general coloration is orange cinnamon with dorsal surfaces of head and pronotum walnut brown. The sides of the abdomen are marked with fuscous as in the males of all the species of the present group.

The type is unique.

**Melanoplus mirus**<sup>83</sup> new species. Pl. XII, fig. 13; pl. XIII, figs. 14, 15, 16.

The present insect is a development of the *M. puer* type, showing a very striking specialization of the male subgenital plate, which is even more produced and compressed than in *M. strumosus*. Males of the present species have, however, a very simple supra-anal plate, much as in *M. puer*, while the pronotum, noticeably broader caudad than cephalad, shows further affinity to that species and also to *M. rotundipennis*. The entire absence of furcula is, however, found elsewhere in the group only in *M. stegocercus* and *M. scapularis*.

TYPE: ♂; Weldon, Halifax County, North Carolina. July 24, 1913. (Hebard.) [Hebard Collection, Type No. 110.]

*Description of Type.*—Size and form similar to moderately large south Florida males of *M. puer*. Limbs, absence of furcula and character of supra-anal plate all agreeing with *M. scapularis*. Tegmina much as in *M. rotundipennis*.<sup>84</sup> Extremity of abdomen tumid, greatly produced and upcurved; supra-anal plate simple as in *scapularis*, but with lateral margins very weakly convex and converging evenly caudad (fig. 14), furcula absent; cerci moderately broad at base, narrowing sharply to half this width mesad, thence after a sharp inward flexion of the shaft expanding distad to a width as great as the base, from which point narrowing, again with an even curvature, to the sharp disto-ventral apex, all of the narrowing and widening is due to the curvature of the dorsal margin, the ventral margin is almost straight,<sup>85</sup> the apices of the two cerci are attingent just beyond the distal extremity of the supra-anal plate (fig. 15); disto-ventral abdominal segment produced mesad in a very small sharp point, subgenital plate greatly produced, compressed, stela-

<sup>83</sup> In allusion to the remarkable genitalia of the male sex.

<sup>84</sup> The size, shape and degree of separation of the tegmina vary considerably in the present series.

<sup>85</sup> In consequence the outline of the distal enlargement of the cerci bears a close resemblance to the outline of a duck's head.

form conical, with apex sharply rounded (length 2.6 mm.) (fig. 16).

*Allotype*: ♀; Same data as the type. [Hebard Collection.]

*Description of Allotype*.—Closely resembling in size and form moderately large south Florida females of *M. puer*, but with principal sulcus somewhat more decided on dorsum of pronotum; color pattern and tegmina (though extremely variable) much as in *M. rotundipennis*. When compared with this latter species the insect is found to be smaller and much more compact with shorter and more robust limbs.

*Measurements (in millimeters).*

	♂ ♂			♀ ♀		
	TYPE.	Paratypes.		<i>Allotype.</i>	Paratypes.	
Length of body.....	16.2	15.5	15.8	18.8	20	19.5
Length of pronotum.....	3.6	3.7	3.8	4.2	4.1	4.7
Length of tegmen.....	3.7	3	3.4	4.3	3.7	3.9
Greatest width of same.....	2.3	2.2	2.4	2.9	2.8	2.9
Length of caudal femur.....	9.7	9.4	9.8	10.8	10.6	11.2
Greatest width of same.....	2.7	2.6	2.7	2.8	2.8	2.7

The specimens have the caudal margin of the dorsum of the pronotum extremely weakly emarginate mesad, so weak indeed as to be scarcely appreciable to the naked eye except in one female. This character is often found in species of the present group, but nowhere as decided as in *M. puer*.

A more or less noticeable truncation of the tegminal apex is present in all of the material before us, with the exception of a single paratype male.

In coloration the species generally resembles *M. rotundipennis*, except that the males differ decidedly in having the ventral margins of the caudal femora sharply pale and quite striking, this marking broader proximad. The females are similarly marked, but to a much less and usually inconspicuous degree.

The species was found very scarce in scattered woods of low pines and oaks, with a typical ammophytic undergrowth of huckleberry and other low bushes and plants. The species was recognized as new and several hours were spent in minute search before the six examples were taken, all of these being found in an area not one hundred feet in diameter. The insects were wary, but were found to hide constantly, so that by careful approach and guarding with the net the majority were picked up with ease. The species does not jump vigorously.

*Specimens Examined*.—6; 3 males and 3 females.

Weldon, North Carolina, VII, 24, 1913, (H.), 3 ♂, 3 ♀, TYPE, *allotype* and paratypes.

**Melanoplus scapularis**<sup>86</sup> new species. Pl. XII, fig. 14; pl. XIII, figs. 17, 18.

Closely related to *M. rotundipennis*, but differing very greatly in the male genitalia. Females of the two species are very similar, but those of the present insect are separable by the more nearly attingent tegmina, which are also more ample and more nearly rotundate.

TYPE: ♂; Jesup, Wayne County, Georgia. September 1, 1911. (Rehn & Hebard.) [Hebard Collection, Type No. 111.]

*Description of Type.*—Size and form similar to *M. rotundipennis*, but somewhat more compact; cephalic and median femora less swollen, the caudal femora slightly shorter and a little deeper in proportion to their length. Tegmina abbreviate, rotundate, but very little longer than broad, attingent. The tegminal length much more nearly approximates the breadth of the same than in *rotundipennis*. Extremity of abdomen tumid, strongly upcurved; supra-anal plate decidedly longer than in *rotundipennis*, but otherwise similar (fig. 17), furcula absent; cerci broad at base, distal portion broadly expanding into a lamellate plate resembling a scapula, greatest width at distal extremity hardly greater than length of cercus, dorso-distal angle rotundato-rectangulate, disto-ventral angle acute angulate, distal margin obtusely emarginate (fig. 18). The soft integument between the supra-anal and subgenital plates does not rise above the dorsal margin of the latter plate in the present insect.<sup>87</sup>

*Allotype*: ♀; Same data as the type. [Hebard Collection.]

*Description of Allotype.*—Very similar to females of *M. rotundipennis*, but may be separated by the tegminal characters given above. (All of the females before us have the tegmina either attingent or separated by the scantiest interspace, the extreme separation being shown by a female from Isle of Hope in which the least width between the tegmina is .3 mm.) In structure *scapularis* is a little more compact with shorter and heavier caudal femora.

*Measurements (in millimeters).*

	♂ ♂		♀ ♀	
	TYPE.	Paratypes.	Allotype.	Paratypes.
Length of body..	.15	16-16.7	22.2	19.7-21
Length of pronotum	3.9	3.8- 3.9	5.1	4.8- 4.9
Length of tegmen	3	3- 3.2	4.2	3.8- 3.9
Greatest width of same	2.4	2.2- 2.6	3.1	2.9- 3.1
Length of caudal femur..	10	9.7-10.2	12.5	11.6-11.9
Greatest width of same	2.9	2.7- 2.9	3.7	3- 3.2

<sup>86</sup> In allusion to the scapuliform cerci.

<sup>87</sup> In *M. rotundipennis* this integument is produced upward in an acute protuberance, which rises conspicuously above the distal margin of the subgenital plate.

The other specimens of the species before us agree fully with the above measurements.

In coloration the present species closely resembles *rotundipennis*, but the series before us is all rather dark and, in all but two females from Isle of Hope, the dorsal portion of the lateral lobes of the pronotum including the metazona is blackish.

The present species was found in a restricted area of a sandy tract covered with various low bushy plants, such as *Myrica pumila*, *Quercus minima*, gall-berry bushes and saw palmettoes (Jesup), and in scant undergrowth of the slightly more elevated portions of the flat almost swampy gray-bark pine woods (Sandfly, Isle of Hope). The species was very scarce, long-continued and thorough search being made for it at each locality where it was found.

*Specimens Examined*.—15; 5 males, 8 females and 2 immature specimens.

Sandfly, Chatham County, Georgia, IX, 3, 1911, (H.), 1 ♂, 1 ♀, (in coitu.)

Isle of Hope, Chatham County, Ga., IX, 3, 1911, (R. & H.), 4 ♀, 1 juv. ♂.

Jesup, Wayne County, Ga., IX, 1, 1911, (R. & H.), 4 ♂, 3 ♀, 1 juv. ♀, TYPE, *allotype* and paratypes.

**Melanoplus strumosus** Morse. Pl. XIII, figs. 19, 20, 21.

*North Carolina.*

Fayetteville, IX, 6, 1911, (H.), 1 ♀.  
Ivanhoe, VII, 1907, (L. M. Smith),  
1 ♀, [U. S. N. M.].

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 2 ♀.  
Yemassee, IX, 4, 1911, (H.), 1 ♂, 1 ♀.

*Georgia.*

Tallulah Falls, VIII, 5, 1909, (J. C. Bradley), 1 ♀.  
Currahee Mountain, VIII, 5, 1913, (H.), 6 ♂, 2 ♀.  
Spring Creek, VI, 7-23, 1911, VII, 26-28, 1913, (J. C. Bradley), 2 ♀.

This insect, which may be said to be the most aberrant of the Puer Group, differs from all other species in this group in the shape of the male supra-anal plate and furcula, which have been well figured and described by Morse.<sup>88</sup>

A certain similarity to *M. stegocercus* in the form of the male subgenital plate is apparent, but in the present insect this plate distad narrows considerably more and is also deflected dorsad, which gives the apex of the abdomen a very different appearance (fig. 21). The cerci suggest in contour those of *M. mirus*, but are decidedly smaller, less flexed and more simple in outline (fig. 20). It is interesting to note that while *stegocercus*, *mirus* and *strumosus* show a common an-

<sup>88</sup> Carnegie Inst. Wash., Publ. No. 18, pp. 51-53, figs. 12, 13, (1904).



cestry, and all have a peculiar and very decided development of the subgenital plate, *stegocercus* is particularly remarkable in cercal characters, *mirus* in the greatest specialization of the subgenital plate combined with very peculiar cerci, while *strumosus* has quite similar cerci to *mirus*, though these are much smaller, but is very different from all other members of the present group in the characters of the supra-anal plate and furcula (fig. 19).

The females of the present species would be almost indistinguishable from females of *M. rotundipennis*, were it not for the fact that in the latter species the cephalic width of the dorsum of the pronotum is less than the caudal width of the same to a degree not found in the present insect.

The variation in size of the present species does not appear to be geographically correlated in any way. The five Currahee Mountain males range in length from 16 to 17 mm., while the largest females are from Tallulah Falls and Spring Creek, 23.5 and 26.2 mm., respectively. The smallest female before us is also from Spring Creek, in length 20.1 mm. Though usually wide, the interspace between the tegmina is decidedly variable in the present species.

In coloration the majority of the series before us have the caudal femora showing scarcely any traces of fuscous bars, one female from Florence, however, has these bars weakly indicated, while the Yemassee female and the two Spring Creek individuals of the same sex have these bars heavy and very pronounced.

The species was found very scarce on the ground among oak sprouts (Fayetteville, Florence), in underbrush on higher ground, just above where the short-leaf pines disappeared, and in oak sprouts in long-leaf pine woods (Yemassee), while on Currahee Mountain it was found very local on the mountain summit in the luxuriant mountain undergrowth of grasses, vines and oak sprouts (particularly about the latter), in a forest predominantly black-jack oak.

#### *The Mancus Group of the Genus Melanoplus.*

Of the five species originally included in his "Mancus Series" by Scudder, one only properly belongs to it, this being *mancus*. *Scudderi* belongs to a group of which it is the best known representative, while the other three species should be distributed over three other groups which show natural relationships. With *mancus*, however, should be associated *M. islandicus* Blatchley and *celatus*, *sylvestris* and *divergens* Morse, the proper sequence apparently being *divergens*, *mancus*, *islandicus*, *celatus* and *sylvestris*.

**Melanoplus sylvestris** Morse.*North Carolina.*

Black Mountain, VII, 1912, (W. Beutenmüller), 2 ♀, [Davis Cl.].

*Georgia.*

Clayton, 2,000-3,700 feet, VI, 1909, (W. T. Davis), 1 ♂.

Rabun County, VII, 1910, (W. T. Davis), 1 ♀.

Tuckoluge Creek, Rabun County, VII, 1910, (W. T. Davis), 1 ♀.

Pinnacle Peak, Rabun County, VIII, 20, 1913, (J. C. Bradley), 2 ♀.

Rabun Bald, Rabun County, 4,000-4,800 feet, VIII, 21, 1913, (J. C. Bradley), 1 juv. ♀.

This form is clearly an offshoot of *M. islandicus* as stated by Morse, probably being but a geographic race. The male here listed shows an even greater elongation of the cercus than seen in the figure given by Morse, but this is not surprising, the types being from central western North Carolina. The Georgia material from a more extreme geographic point could be expected to show a greater development of the features which differentiate the form.

The species is only known from the localities given above, and Blowing Rock, Linville, Lovering's and Pineola, North Carolina (Morse).<sup>89</sup>

*The Scudder Group of the Genus Melanoplus.*

We have placed *M. carnegiei* and *scudderi* in a group which is easily distinguished from the "Mancus Series" in which *scudderi* was previously placed.

**Melanoplus carnegiei** Morse.*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.), 1 ♂, 5 juv. ♂, 10 juv. ♀.

Yemassee, IX, 4, 1911, (R. & H.), 18 ♂, 14 ♀, 2 juv. ♀.

*Georgia.*

Pinnacle Peak, Rabun County, VIII, 20, 1913, (J. C. Bradley), 4 ♂.

Toccoa, VIII, 4-5, 1913, (H.), 25 ♂, 3 juv. ♂, 10 juv. ♀.

Currahee Mountain, VIII, 5, 1913, (H.), 22 ♂, 12 ♀, 5 juv. ♂, 2 juv. ♀.

Jasper, VIII, 5, 1913, (R.), 2 ♂, 4 juv. ♂, 3 juv. ♀.

Sharp Mountain, VIII, 6, 1913, (R.), 8 ♂, 6 ♀, 3 juv. ♀.

Silver Lake, Fulton County, VIII, 10, 1913, (J. C. Bradley), 1 ♂.

Buckhead, VIII, 2, 1913, (R. & H.), 2 ♂, 5 juv. ♂, 5 juv. ♀.

Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 5 juv. ♂, 4 juv. ♀.

Warm Springs, 850-1,200 feet, VIII, 9-10, 1913, (R.), 7 ♂, 1 ♀, 2 juv. ♂, 5 juv. ♀.

Macon, VII, 30-31, 1913, (R. & H.), 1 ♂, 11 juv. ♂, 15 juv. ♀.

Augusta, VII, 29, 1913, (R. & H.), 1 ♂, 5 juv. ♂, 5 juv. ♀.

Available data show that *carnegiei* has a fairly extended range through diverse conditions in the southeastern States, this extending from Sulphur Springs, North Carolina, Pinnacle Peak and Blue Ridge,

<sup>89</sup> The record of this species from Thomasville and Metcalfe, Georgia, made by the authors (PROC. ACAD. NAT. SCI. PHILA., 1904, p. 791, (1905)), is erroneous, that reference instead relating to *M. rotundipennis*, a species then unknown to them.

Georgia, south and east as far as Warm Springs and Macon, Georgia, and Yemassee, South Carolina. The material shows a great amount of individual variation in size, both sexes exhibiting this in material from the same locality, collected in the same environment. Certain individuals, particularly of the female sex, show a general lightening of the entire coloration, while very rarely (one adult and certain nymphs) the pronotum is washed with pinkish. The adult male from Augusta is very pale and quite ochraceous, with the dorsal femoral markings very decided, solid and regular. These markings vary appreciably in individuals of relatively the same color depth. There is some variation in both sexes in the form of the tegmina, the distal section being more rounded and less subangulate in certain specimens than in others.

From the available evidence we find that the species occurs adult as early as July 25 (Blue Ridge, Georgia; Morse) and as late as October 7 (Sulphur Springs, North Carolina; Rehn & Hebard), few adults having appeared as late as August 4 (Toccoa).

This form is always sylvan in habitat, occurring on the ground under oaks and in mixed oak and pine woods. On one occasion it was found about low scrub oak scattered over a sandy area (Augusta).

**Melanoplus scudderi scudderi** (Uhler).

*Virginia.*

Orange, VII, 21, 1913, (R. & H.),  
1 juv. ♂.  
Lynchburg, VII, 22, 1913, (R. & H.),  
2 juv. ♂, 2 juv. ♀.  
Natural Bridge, IX, 12 and 13, 1907,  
(B. Long), 1 ♀.  
Petersburg, VII, 23, 1913, (R. & H.),  
2 juv. ♂.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.),  
2 juv. ♂, 3 juv. ♀.  
Goldsboro, VII, 25, 1913, (R. & H.),  
1 juv. ♂.  
Fayetteville, IX, 9, 1911, (R. & H.),  
17 ♂, 4 ♀, 1 juv. ♂, 5 juv. ♀.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♀.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.),  
3 juv. ♂, 3 juv. ♀.  
Florence, IX, 6, 1911, (R. & H.), 8 ♂,  
3 ♀, 6 juv. ♀.

*Georgia.*

Thompson's Mills, X, 1910, (H. A. Allard), [U. S. N. M.].  
Austell, VIII, 27, 1911, 2 ♂, [Ga. State Cln.].  
Albany, VIII, 1, 1913, (R. & H.),  
6 juv. ♂, 5 juv. ♀.  
Bainbridge, IX, 7-X, 19, 1910, (J. C. Bradley), 1 ♀.

From a study of the material before us from the eastern and southeastern States, it is evident that southwards both sexes show a gradual broadening of the tegmina and rounding of the distal margin of the same. This feature is similar to that found in the Texan form, *scudderi texensis* Hart, of which we have typical material, but that race also has the general form more compressed in both sexes, the furcula longer, the subgenital plate less produced and some features of the coloration different. The relationship of the material

seen from all of Georgia (Austell south to Thomasville) and from the Carolinas is clearly with Middle States and New England *s. scudderi*, although showing a parallelism to one of the features of *s. texensis*, but representative of the typical form in all the other characters.

Individual size variation in this species is considerable, but there is also an average southward increase in the general bulk.

The earliest date we are acquainted with on which adults have been taken in the southeastern States is August 24 (Chattanooga, Tenn.; Morse), while we have secured material as late as December 14 (Thomasville, Ga.; Hebard).

The species was taken in sylvan surroundings, the undergrowth of pine and oak woods being its favorite situation.

*The Fasciatus Group of the Genus Melanoplus.*

A tentative study of the species which have been referred to this division shows that a recasting of the whole aggregation is necessary, but our collated information is not sufficiently extensive to say more than that *fasciatus*, *querneus*, *franciscanus*, *nigrescens* and *walshii* are certainly, and *inconspicuus* probably, members of this assemblage. We can state definitely that *attenuatus*, *borealis*, *cockerelli*, *obovatifpennis*, *rotundipennis*, *morsei* and *tepidus* are not to be included in the same category. Of these *attenuatus* is a member of the Decorus Group, *obovatifpennis*, *morsei* and *tepidus* are members of the Tribulus Group and *rotundipennis* belongs to the Puer Group, while *amplectens* is a synonym of *walshii* and *juvencus* equals *viridipes*, a member of the Gracilis Group. Scudder's *saltator* belongs to another category, including *ascensus* and other species.

The species of this group apparently form a transition to the constantly long-winged forms of the genus, the relationship being chiefly, however, with the short-winged forms. The sequence of species known to belong to this division appears to us to be as given above.

**Melanoplus querneus** new species. Pl. XIV, figs. 1, 2, 3.

1905. *Melanoplus nigrescens* Rehn and Hebard (not of Scudder), Proc. Acad. Nat. Sci. Phila., 1904, p. 791. [Thomasville, Georgia.]

A member of the *fasciatus* group and more nearly related to *M. walshii* and *nigrescens* than to any of the other members of the genus. In general structure and coloration the new species is practically identical with the two older forms, but it differs from both in the slightly longer tegmina in both sexes, the broader sublamellate male

cerci, which are subconstricted mesad, and in the rounded and hardly produced apical margin of the subgenital plate of the same sex. The females of the three species are very similar, but the constantly longer tegmina and slightly less bicolored character of the same in *querneus* enable one to distinguish it.

TYPE: ♂; Thomasville, Thomas County, Georgia. November 30, 1903. (Morgan Hebard.) [Hebard Collection, Type No. 116.]

*Description of Type*.—Size large; form moderately robust. Head as in *nigrescens* except for the frontal costa failing to reach the clypeal suture; antennæ very long, slightly longer than the pronotum and tegmina together. Pronotum as in *nigrescens*. Tegmina almost or quite reaching the region of the furcula when the abdomen is in the usual somewhat recurved position, appreciably longer than in *nigrescens*, considerably exceeding the combined length of the head and pronotum, subacuminate, the apices narrowly rounded; sutural margins moderately arcuate. Prosternal spine similar to that of *nigrescens*; interspace between the mesosternal lobes slightly broader and less decidedly longitudinal than in *nigrescens*; interspace between the metasternal lobes subattinent, but not contiguous as in *nigrescens*. Abdomen subcompressed proximad, with a fairly distinct and moderately elevated medio-longitudinal carina; furcula merely the briefest of points projecting from the disto-dorsal abdominal segment, poorly indicated on the surface of the segment as broad, rounded areas, between which the segment is emarginate; supra-anal plate as in *nigrescens*, but the proximal medio-longitudinal sulcus and its marginal carinæ are more decided and the median transverse carina is more strongly indicated (fig. 3); cerci broad, sublamellate, the greatest distal width hardly more than half the length, broad at base, somewhat narrowing to the middle, the whole dorsal margin arcuato-emarginate, the disto-dorsal angle rotundato-rectangulate, distal margin arcuato-truncate and gently rounding into an obliquely truncate disto-ventral section, which latter passes by a very slight angle into the ventral margin, distal section with surface faintly tumid and separated from distal margin by an arcuate impression (fig. 1); subgenital plate distinctly broader than long, the apical margin semi-elliptical in shape when seen from the dorsum, when seen from the side moderately emarginate with a faintly produced extremity (fig. 2). Cephalic and median limbs slightly more elongate than in *nigrescens*. Caudal femora similar to those of *nigrescens*, but dorsal outline more concave distad; caudal tibiæ with external spines ten to eleven in number.



*Allotype*: ♀; Same data as type but taken December 3, 1903. [Hebard Collection.]

*Description of Allotype*.—Differing only from the same sex of *nigrescens* in the average larger size, actually as well as proportionately, longer antennæ, longer tegmina and more robust and less attenuate ventral valves of the ovipositor. The tegmina are distinctly longer than the head and pronotum together. The ventral jaws of the ovipositor are well decurved at the apex and have the proximal tooth strongly indicated, these being more slender, straighter and with a weaker tooth in *nigrescens*, while in *walshii* the valves, though nearly as straight as in *nigrescens*, are heavier and nearer in form to those of *querneus*.

*Measurements (in millimeters).*

Thomasville, Ga.		Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂	XI, 30, 1903. TYPE.....	22.5	6.2	10	15.8
♂	XI, 12, 1902. Paratype.....	27.1	6.5	11.7	16.7
♀	XII, 3, 1903. Allotype.....	32.2	6.7	11.6	17.3
♀	XII, 10, 1903. Paratype.....	32.8	7.9	12.5	18.3

In size there is some little variation, particularly in the male sex, the type and allotype being about the minimum for each sex, the maximums being measured above. The males show practically no individual variation at all in the form of the appendages, there being but a scarcely perceptible amount in the relative depth of the cercus, while the females show no noteworthy structural variation.

*Color Notes*.—Detailed color descriptions made from life have already been published for this species (see above). In consequence we will only comment on the differences noted from those descriptions. The general coloration is diluted or brightened in certain individuals, the pale tones becoming cinnamon buff on the dorsum of the head, pronotum, anal field of tegmina, pleural streak and caudal femora, while rarely the deepening of the coloration has resulted in a general benzo brown to fuscous tone, with the dark markings fuscous black to shining black. The caudal tibiæ occasionally show no trace of maroon or poppy red, but are largely dull honey yellow with the usual proximal suffusion. The less bicolored condition of the tegmina in this species, when compared with *walshii* and *nigrescens*, is due to the more pronounced breaking up into small maculations of the blackish fuscous of the discoidal and marginal fields, while in *nigrescens* and *walshii* these areas are more uniformly

colored and consequently more contrasted with the almost invariably paler anal area. We have but one specimen of *querneus*, a male, which shows little or no contrast between the two sections of the tegmina, this being the very dark individual mentioned above.

In addition to the type and allotype, we have before us a series of ten males and thirteen females, taken at Thomasville on dates extending from November 30 to December 13, 1902-1903, all of which may be considered paratype.

Before we were able to examine specimens of undoubted *nigrescens* we referred to this species by that name, but now with Scudder's species in hand it is quite evident that the two are distinct.

This species was found frequenting the vicinity of scrub oaks in the pine and oak woods. Extensive notes on the habits of the species have been previously published (*vide supra*).

**Melanoplus nigrescens** (Scudder).

Lake Waccamaw, North Carolina, IX, St. Simon's Island, Georgia, VIII, 30, S, 1911, (R. & H.), 1 ♂. 1911, (R. & H.), 4 ♂, 11 ♀.

The above records, with those of Scudder from "Georgia" and Smithville, North Carolina, form all the information we have on the range of this species, as the record of *nigrescens* from Thomasville, Georgia, made by the authors<sup>90</sup> we now find to have been based on the allied but distinct new species, *M. querneus*, which is described above. We find on comparison that *nigrescens* is closely related to *walshii*, differing chiefly in details of the dorsum of the pronotum, in the peculiar offset or twist of the distal section of the male cercus and in the more pronounced apex of the subgenital plate of the same sex. The females are almost indistinguishable, the more delicate median carina of the pronotum, the straighter ovipositor jaws (particularly ventral) and the more subequal and less distinctly tapering prosternal spine being about all the really tangible characters in *nigrescens* to separate that sex from *walshii*. In coloration the two species are almost identical, each varying to about the same degree individually, although on the whole *nigrescens* has the dorsal aspect generally paler. There can be no question but that both species are members of the same species group.

The size shows but little variation in the series and this is slightly more pronounced in the female than in the male sex.

From the records the species seems to be restricted to the lower portion of the Coastal Plain within the Sabalian or Basic Austral Zone.

<sup>90</sup> PROC. ACAD. NAT. SCI. PHILA., 1904, p. 791, (1905).

The Lake Waccamaw specimen was taken in heavy undergrowth of bushes in short-leaf pine woods, while on St. Simon's Island the species occurred in very few numbers among dead leaves under live oaks. In the latter situations there was practically no ground vegetation owing to the constant shade of the oak groves. A particular search was made for the species elsewhere as well as on St. Simon's Island and all seen were secured. The date for the Smithville record given by Scudder is November 22, so the species is seen to be present, where found, from late August to the latter part of November.

**Melanoplus walshii** Scudder.

1897. *Melanoplus walshii* Scudder, Proc. U. S. Nat. Mus., XX, p. 235, pl. XV, fig. 10.

1897. *Melanoplus amplexans* Scudder, *ibid.*, p. 260, pl. XVII, fig. 7.

1897. *Melanoplus blatchleyi* Scudder, *ibid.*, p. 322, pl. XXI, fig. 10.

*North Carolina.*

Black Mountain, VII and VIII, 1912.  
(W. Beutenmüller), 4 ♂, 11 ♀, [Davis  
Cln.]

*Georgia.*

Rabun Bald, Rabun County, VII,  
1910, (W. T. Davis), 1 ♂, 1 ♀.

Currahee Mountain, 1,700 feet, VIII,  
5, 1913, (H.), 9 ♂, 4 ♀.

Sharp Mountain, 1,800-2,000 feet,  
VIII, 6, 1913, (R.), 3 ♂, 3 ♀.

Dalton, 850-1,200 feet, VIII, 7, 1913,  
(R.), 1 ♀.

The above synonymy is evident after examining all the typical material involved,<sup>91</sup> the individual and to an extent geographic variation found in the species probably being responsible for Scudder's confusion. The general size, form of the cerci, furcula, supra-anal and subgenital plates, caudal femora and tegmina, as well as certain features of the coloration, are found to be variable in the series of eighty-one specimens from seventeen localities before us. The largest specimens are from the Missouri valley region, but the variation in this respect at any locality represented by a series is seen to be very considerable. It is quite possible that the acquisition of more material from the Mississippi and Missouri valleys will show the desirability of recognizing two races of this species, one a western one to which the name *blatchleyi* (proposed to replace Bruner's preoccupied *Pezotettix occidentalis*, described from Omaha, Nebraska) should be limited, and the other to which typical *walshii*, with *amplexans* as a synonym, would be applied. There can be no question but that these forms, if recognizable, are but races of one species, for which the name *walshii* must be used. At present we

<sup>91</sup> Morse has already placed *blatchleyi* in the synonymy under *amplexans*. Carnegie Inst. Wash., Publ. No. 18, p. 50, (1904).

lack sufficient material to enable us to test out satisfactorily the geographic value of characters suggested by our series.

We have before us the typical material on which Bruner's *occidentalis*, the basis of *blatchleyi*, was founded and have examined all the types of both *walshii* and *amplectens*, hence the above synonymy has been established by reference to the basic material.

That Scudder was in great difficulty with this variable species is evidenced by his treatment of the synonymic names. The first, *walshii*, he placed in his *rusticus* series, the second, *amplectens*, in his *fasciatus* series and the third, *blatchleyi*, in his *texanus* series. In our opinion the species clearly belongs to the *Fasciatus* Group; that is, it should be placed in the general vicinity of *fasciatus*, for while the genitalia are different in some respects, a number of other features are very similar.

The extremes in size in the present series are as follows:

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂ Rabun Bald, Ga.....	19.1 mm.	5 mm.	6.2 mm.	11.5 mm.
♂ Currahee Mtn., Ga.....	25.2 "	5.7 "	7.2 "	14.2 "
♀ Rabun Bald, Ga.....	25.2 "	5.7 "	8 "	13.9 "
♀ Currahee Mtn., Ga.....	29.8 "	6.5 "	8.2 "	15.9 "

The Currahee Mountain and Sharp Mountain series show considerable individual variation in size, the minimum of the female sex from Currahee Mountain being hardly larger than the minimum measured above, while the Sharp Mountain lot shows even greater variation in the male than is found in the same sex in the Currahee Mountain representation. There is very little variation in color, the most apparent being the degree of infuscation of the anal area of the tegmina, the presence or absence of the pale spot proximo-dorsad on the external pagina of the caudal femora and the absence or presence, depth and extent of a dark pregenicular annulus on the caudal tibiae.

All of the specimens taken by us were secured in the normal sylvan habitat of the species; on Currahee Mountain on the upper slopes of the mountain, among the heavy undergrowth of vines, oak sprouts and grasses in a forest composed chiefly of black-jack oak, being only occasional on the slopes and fairly abundant on the summit; on Sharp Mountain under similar conditions in a forest of coniferous and deciduous trees and all seen were taken, while at Dalton one was secured on a steep slope under deciduous trees.

*Long-winged Species of the genus Melanoplus.***Melanoplus atlantis** (Riley).*Maryland.*

Glen Echo, VII, 10, 1914, (H.), 1 ♂.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 1 ♂, 4 ♀.

Orange, VII, 21, 1913, (R. & H.), 1 ♂, 4 ♀.

Natural Bridge, IX, 12-13, 1907, (B. Long), 1 ♂, [A. N. S. P.].

Lynchburg, VII, 22, 1913, (R. & H.), 2 ♀.

Petersburg, VII, 23, 1913, (R. & H.), 2 ♀.

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.), 1 ♂.

Weldon, VII, 24, 1913, (R. & H.), 1 ♂, 1 ♀.

Charlotte, VII, 27, 1913, (R. & H.), 1 ♂.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 2 ♀.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.), 1 ♂.

Sumter, V, 30, 1914, (W. Stone), 1 ♀, [A. N. S. P.].

Manning, V, 23 to 30, 1914, (W. Stone), 5 ♂, 4 ♀, 1 juv. ♀, [A. N. S. P.].

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 2 ♂, 5 ♀.

Clayton, 2,000-3,700 feet, VI, 1909, (W. T. Davis), 3 ♂.

Buckhead, VIII, 2, 1913, (R. & H.), 1 ♂.

Macon, VII, 30-31, 1913, (R. & H.), 1 ♂.

The present species is relatively infrequent in the Coastal Plain south of North Carolina and the lower Gulf drainage of southern Georgia, in addition having never been definitely recorded from peninsular Florida. That from Thomasville (Rehn & Hebard) is the only known south Georgia record and Marianna (Morse) is the only definite Florida locality.

The present representation shows considerable individual variation in general size and in tegminal length, while the coloration shows the usual variability of this plastic species. One of the Rabun County males has the caudal tibiae pale glaucous clouded with brownish proximad and distad.

The above specimens secured by us were all taken in cultivated or waste fields, being common nowhere except at Orange and Petersburg, while generally very scarce.

**Melanoplus impudicus** Scudder.*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.), 1 ♀.

*Georgia.*

Currahee Mountain, VIII, 5, 1913, (H.), 2 ♂, 6 ♀.

Dalton, VIII, 7, 1913, (R.), 1 ♀.

Lost Mountain, Cobb County, VII, 13, 1913, 1 ♂, [Ga. State Cln.].

Warm Springs, VIII, 9-10, 1913, (R.), 2 ♀.

Spring Creek, VII, 16-29, 1912, (J. C. Bradley), 1 ♀.

The present material, when compared with a New Jersey series before us, is found to have the tegmina and wings somewhat longer, these slightly surpassing the tips of the caudal femora in the majority



of southern specimens, while the coloration is more uniform and much as in the least maculate of the New Jersey specimens. The few specimens before us from Indiana agree perfectly with New Jersey material, but are all of the less maculate type of coloration.

Occasional small, dark and exceptionally compact females of *M. luridus*, having abbreviate tegmina, might easily be confused with examples of the same sex of the present species. Examination, however, reveals the fact that the ovipositor jaws in that species are longer, with their narrowed distal portions much longer and less curved. Further examination shows that such examples of *M. luridus* have larger, more protuberant and darker eyes, a less trim pronotum, heavier limbs and other characters by which they can be distinguished. Typical females of *M. luridus* are very different, even in superficial appearance, from typical females of the present species.

The series here recorded was taken in a pine forest on a hillside (Columbia), in a heavy tangle of pine and oak woods undergrowth (Dalton, Warm Springs) and on Currahee Mountain very few were found at the summit (1,700 feet) in the heavy mountain undergrowth of a low forest predominantly black-jack oaks, while in the undergrowth of the pine woods at the upper limit of the gradual slopes (1,300 feet) other specimens were taken.

This insect is known to be an Austral species of localized distribution. It has been recorded from Jamesburg, southward at other localities in the pine barrens of New Jersey; Murphy, North Carolina; Denmark and Spartanburg, South Carolina; Blue Ridge, Chickamauga and Sand Mountain, Georgia, and Monticello, Mississippi. Further west it is known from numerous counties in north-western Arkansas, and in the upper Mississippi valley region from Gibson County, Indiana, and Havana and Ozark Ridge, Illinois.

***Melanoplus femur-rubrum femur-rubrum* (De Geer).**

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 1 ♂.  
Orange, VII, 21, 1913, (R. & H.), young.  
Lynchburg, VII, 22, 1913, (R. & H.), 1 ♂.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 ♂.  
Clayton, VII, 1910, (W. T. Davis), 1 ♀.  
Stone Mountain, VII, 3, 1913, (R. & H.), 3 ♂, 2 ♀, 4 juv. ♂.  
Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.), 1 juv. ♂, 3 juv. ♀.

Immature specimens of the species were found in great numbers at all of the localities in Virginia listed above. The insect is very abundant everywhere in the upland grass-lands of Virginia, but south of this region it is much less numerous and less generally distributed.

At Stone Mountain, Georgia, adults were occasional and the young fairly abundant in the frequent areas of bunch-grass on the mountain.

Specimens from high elevations in Georgia are typical of the species. Those from Stone Mountain and its vicinity show a slight approach toward the southeastern race.

The present form is found southward on the Atlantic coast as far as southern Virginia, south of this its southeastern distribution does not extend down from the Appalachians as far as the fall line. Its range probably extends eastward along the Gulf Coast from Texas as far as Alabama, for in that State, Morse secured intermediates between it and the southeastern race at Flomaton. Material previously recorded by us from Newbern, North Carolina,<sup>92</sup> is really intermediate and shows a closer affinity to the southeastern race.

**Melanoplus femur-rubrum propinquus** Scudder.

*North Carolina.*

Wrightsville, IX, 7, 1911, (R. & H.), 2 ♂.

Winter Park, IX, 7, 1911, (R. & H.), 2 ♂, 3 ♀.

Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂.

*South Carolina.*

Columbia, VII, 28, 1913, (R. & H.), 2 ♂, 4 ♀.

Isle of Palms, VIII, 15, 1913, (R.), 3 ♂, 1 ♀.

Sullivan Island, IX, 5, 1911, (R. & H.), 1 ♂.

Yemassee, IX, 4, 1911, (R. & H.), 4 ♂, 3 ♀.

*Georgia.*

Augusta, VII, 29, 1913, (R. & H.), 2 ♂, 2 ♀.

Tybee Island, IX, 2, 1911, (R. & H.), 2 ♂, 2 ♀.

Jesup, IX, 1, 1911, (R. & H.), 2 ♂, 1 ♀; XII, 1908, (H.), 1 ♀.

Brunswick, VIII, 30, 1911, (H.), 1 ♂.

St. Simon's Island, VIII, 30, 1911, (R. & H.), 3 ♂.

Cumberland Island, VIII, 31, 1911, (R. & H.), 4 ♂, 1 ♀.

Hebardville, V, 15, 1915, (H.), 1 ♂.

Billy's Island, VI, VII, 1912, (J. C. Bradley), 7 ♂, 18 ♀.

Macon, VII, 30-31, 1913, (R. & H.), 5 ♂, 4 ♀.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂.

Bainbridge, IX-X, 1910, (J. C. Bradley), 1 ♀.

Spring Creek, VII, 1912, (J. C. Bradley), 1 ♀.

*Florida.*

Jacksonville, V, VIII, 1885, (W. H. Ashmead), 3 ♂, 2 ♀, [Hebard Cln.]; IX, XI, 1911-13, (W. T. Davis), 12 ♂, 17 ♀.

Atlantic Beach, VIII, 24-25, 1911, (R. & H.), 2 ♂, 1 ♀.

St. Augustine, XI, 8, 1911, (G. P. Englehardt), 1 ♀, [B. I.].

Live Oak, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀.

Newberry, XI, 19, 1911, (W. T. Davis), 3 ♂.

Tampa, I, 17, 1904, (H.), 1 ♀.

We find the specimens from Wrightsville and Winter Park to be intermediate between the present geographic race and *M. femur-rubrum*. We have typical examples of the present insect from as far north as Lake Waccamaw. Scudder includes specimens from Pungo Bluff, North Carolina, in his typical material of the present insect, but these specimens are intermediates. Differences in the male

<sup>92</sup> PROC. ACAD. NAT. SCI. PHILA., 1910, p. 635, (1911).

genitalia, somewhat analogous to those found in *Aptenopedes s. sphenarioides* and *A. s. clara*, alone separate the present races.

The coloration of the caudal tibiæ of the present race normally varies from carrot red to flesh color, three specimens in the series before us have the reddish hue nearly obsolete (maize yellow, very faintly suffused with pink dorsad), while a single unusually pale specimen, taken in a weedy field near the strand on Cumberland Island, has the caudal femora pale glaucous (light turtle green), shading to pale chalcedony yellow on the proximal and distal portions of the ventral surface.

The insect has very similar habits to typical *femur-rubrum*, being found particularly in grassy and weedy spots in the open. This geographic race is distributed over the southern coastal plain from extreme southern North Carolina, through South Carolina and Georgia, as far west as Flomaton, Alabama, and over entire peninsular Florida, though scarce south of the central portion.

**Melanoplus impiger** Scudder.

Augusta, Georgia, VII, 29, 1913, (R. & H.), 10 ♂, 7 ♀, 1 juv. ♂, 1 juv. ♀.

This is the first record of the species from east of Texas. The specimens here listed have been compared with the type and cotypes in the Hebard Collection ex Bruner and found to be identical. In size there is considerable individual variation, particularly in the male, the extremes from Augusta measuring (in millimeters) as follows:

	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂.....	21.5	5.1	20.2	13.6
♂.....	28.3	6.2	22.2	15.8
♀.....	24.2	5.3	20.8	14.5
♀.....	26.8	6.1	22.7	16.5

In coloration the Georgia individuals are less contrastingly colored than Texan specimens, the pale colors being duller ochraceous and the tegmina more fuscous, while the external paginæ of the caudal femora generally have the usual bars more or less fused into a blackish fuscous area covering the dorsal section of the pagina. The color of the caudal tibiæ ranges as dark as dark orient blue in the glaucous condition and as decidedly red as nopal red in the other type.

The species was found in moderate numbers in a sandy area scatteringly covered with scrub oak.

**Melanoplus confusus** Scudder.

*Melanoplus minor* of authors.

Fredericksburg, Virginia, VII, 20, 1913, (R. & H.), 5 ♂, 2 ♀.

Havelock, Craven County, North Carolina, late V, 1907, and VI, 19-24, 1905, (F. Sherman), 4 ♂, 2 ♀, [N. C. State Dept. Agr.].

We find that *Caloptenus minor* of Scudder<sup>93</sup> (*Melanoplus minor* of authors) is preoccupied by *Caloptenus minor* of Walker.<sup>94</sup> Scudder's *Melanoplus confusus*,<sup>95</sup> described from Munson's Hill and Newport, Kentucky, is, however, the same as his *minor* and the name must be used for the present species. Caudell, finding that Scudder's name *minor* was preoccupied, but misquoting the original generic position as *Pezotettix*, has recently proposed the name *Melanoplus mutatus*<sup>96</sup> for the present species; this name naturally falls in the synonymy under *Melanoplus confusus*.

The specimens from the latter locality listed above were kindly loaned to us by Mr. Sherman, in response to our request to see some of the material on which the record of this species from eastern North Carolina was based.<sup>97</sup> These individuals are perfectly typical of *confusus*, and Havelock is the most southern locality in the east from which the species has been reported.

At Fredericksburg the species was found in short grass on rather barren hillsides bordering the valley of the Rappahannock on the south.

***Melanoplus luridus luridus* (Dodge).**

Black Mountain, North Carolina, VIII, 7, 1912, (W. Beutenmüller), 1 ♂, [Davis Cln.].  
Pinnacle Peak, Rabun County, Georgia, VIII, 20, 1913, (J. C. Bradley), 1 ♂, 3 ♀, 1 juv. ♂, 1 juv. ♀.  
Tuckoluge Creek, Rabun County, Ga., VII, 1910, (W. T. Davis), 1 juv. ♀.

The present insect is widely distributed over the northern United States, extending in southward distribution along the Atlantic coast at least as far as southern New Jersey. In the Appalachians, however, the distribution of the insect is carried southward at considerable altitudes to the most southern portion of these mountains, as the material recorded above demonstrates. In size and robustness the present individuals are much as in the average of material before us from Connecticut. The junior author's record of *M. deletor* from that State<sup>98</sup> applies wholly to the present insect, as do the senior author's records of *M. keeleri* from New Jersey.<sup>99</sup> Both of these

<sup>93</sup> *Proc. Bost. Soc. Nat. Hist.*, XVII, p. 478, (1875).

<sup>94</sup> *Cat. Dermapt. Saltat. Br. Mus.*, IV, p. 699, (1870).

<sup>95</sup> *Proc. U. S. Nat. Mus.*, XX, p. 339, pl. XXII, fig. 10, (1898). We have examined the male lectotype of *confusus* from Munson's Hill, Kentucky, and find no valid character to separate it from *minor* of Scudder. The lectotype and other material has shrivelled from immersion in alcohol and as a result, we have differences in the form of the cerci due solely to distortion.

<sup>96</sup> *Proc. U. S. Nat. Mus.*, XLIX, p. 30, (1915).

<sup>97</sup> Sherman and Brimley, *Ent. News*, XXII, p. 389, (1911).

<sup>98</sup> *Ent. News*, XXI, p. 184, (1910).

<sup>99</sup> Rehn in Smith, *Ins. of New Jersey*, p. 184, (1910).

errors were due to the fact that in these portions of the range of typical *luridus*, frequent females are met with which are larger and decidedly heavier than specimens of the same sex from further north. This must be attributed to variation in *l. luridus*, for the southern race differs in all important respects from such material quite as decidedly as it does from typical *luridus*.

The great amount of variation in the present species is partially shown by the following table of measurements of the extremes of various series before us.

*Measurements (in millimeters).*

		Length of body.	Caudal width of pronotum.	Length of tegmen.	Length of caudal femur.
♂ ♂					
Aweme, Manitoba.....	(2) <sup>100</sup>	18-19.1	2.5-2.8	16-16.4	10.8-11.1
Pequaming, Michigan.....	(1)	17	2.4	13.7	10
Cape Cod, Massachusetts.....	(2)	17.4-18.3	2.5-2.6	12.4-13.1	10.2-10.5
New Haven, Connecticut.....	(5)	18.5-19.5	2.8-3.1	12.7-15.4	11.7-12
Stafford's Forge, N. J.....	(11)	17-20	2.7-3	12.9-15	10.5-12
Mount Pisgah, N. C.....	(8)	18.5-18.8	2.7-2.8	13.8-14.6	10.7-11.6
Pinnacle Peak, Ga.....	(1)	19.2	3	14.9	12.3
♀ ♀					
Aweme, Manitoba.....	(2)	20.2-21.7	3.2	16-16.3	11-11.7
Pequaming, Mich.....	(8)	19.6-20.3	3.1-3.4	15.9-17.8	10.8-11.6
Cape Cod, Mass.....	(2)	23.5-25	3.5-3.7	15.7-15.8	12.9-13.3
New Haven, Conn.....	(7)	23.7-27.4	3.5-4	15.2-17	13.2-15.3
Stafford's Forge, N. J.....	(8)	22.5-25.2	3.4-4	11-16	11.8-14
Mount Pisgah, N. C.....	(7)	22.4-24	3.4-4	13.4-16.9	12.5-13.2
Pinnacle Peak, Ga.....	(3)	24.8-25	3.4-3.8	16.7-18	14.3-15.3

It would be difficult to imagine individuals, without even racial significance, differing more greatly in general appearance than do the long-winged slender examples from the northwestern portion of this insect's range, from the heavy shorter-winged type which is often found in Connecticut and New Jersey southward through the Appalachians. This is particularly true of the female sex; northwestern material bearing a strong superficial resemblance to *M. atlantis*, while the southeastern material is vastly heavier with a very different general appearance. Intergradation between these types is, however, almost everywhere to be found and no valid reason exists for separating eastern and western material as geographic races.

*Melanoplus luridus keeleri* (Thomas).

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.),  
1 ♂, 1 juv. ♂.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.),  
2 juv. ♂, 3 juv. ♀.

<sup>100</sup> The figures in parentheses indicate the number of specimens measured from each locality.



- Charlotte, VII, 27, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.  
 Fayetteville, IX, 9, 1911, (R. & H.), 1 ♀.  
 Wilmington, IX, 8, 1911, (R. & H.), 1 ♀.  
 Winter Park, IX, 7, 1911, (R. & H.), 7 ♂, 10 ♀, 1 juv. ♂.  
 Wrightsville, IX, 7, 1911, (R. & H.), 3 ♂.
- South Carolina.*
- Florence, IX, 6, 1911, (R. & H.), 3 ♂.  
 Columbia, VII, 28, 1913, (R. & H.), 1 juv. ♂, 3 juv. ♀.  
 Ashley Junction, VIII, 15, 1913, (R.), 2 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀.  
 Yemassee, IX, 4, 1911, (R. & H.), 12 ♂, 9 ♀.
- Georgia.*
- Toccoa, VIII, 4, 1913, (H.), 3 juv. ♂, 2 juv. ♀.  
 Currahee Mountain, VIII, 5, 1913, (H.), 8 ♂, 3 ♀, 2 juv. ♂, 1 juv. ♀.  
 Sharp Mountain, VIII, 6, 1913, (R.), 1 juv. ♂, 1 juv. ♀.  
 Buckhead, VIII, 2, 1913, (R. & H.), 2 juv. ♂.  
 Augusta, VII, 29, 1913, (R. & H.), 2 juv. ♂, 5 juv. ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 3 ♂, 4 juv. ♂, 4 juv. ♀.  
 Warm Springs, VIII, 9-10, 1913, (R.), 3 ♂, 3 juv. ♂, 1 juv. ♀.
- Tybee Island, IX, 2, 1911, (H.), 3 ♂, 2 ♀.  
 Isle of Hope, IX, 3, 1911, (R. & H.), 14 ♂, 3 ♀, 1 juv. ♂, 1 juv. ♀.  
 Sandfly, IX, 3, 1911, (R. & H.), 1 ♂, 3 ♀.  
 Jesup, IX, 1, 1911, (R. & H.), 4 ♂, 4 ♀.  
 Waynesville, (J. C. Bradley), 1 ♀.  
 Brunswick, VIII, 30, 1911, (H.), 6 ♂, 2 ♀.
- St. Simon's Island, VIII, 30, 1911, (R. & H.), 5 ♂, 3 ♀, 1 juv. ♀.  
 Cumberland Island, VIII, 31, 1911, (R. & H.), 4 ♂, 1 ♀.  
 Billy's Island, IX, XII, 23, 1911, (J. C. Bradley), 2 ♂.  
 Albany, VIII, 1, 1913, (R. & H.), 1 juv. ♂.  
 Spring Creek, VII, VIII, 1912-13, (J. C. Bradley), 1 juv. ♂, 1 juv. ♀.
- Florida.*
- Jacksonville, VIII, 25, 1911, (R. & H.), 5 ♂, 4 ♀; XI, 5, 1911, (W. T. Davis), 2 ♂, 1 ♀.  
 Atlantic Beach, VIII, 24, 1911, (R. & H.), 10 ♂, 8 ♀.  
 Daytona, XI, 11, 1911, (G. P. Englehardt), 2 ♀, [B. I.].  
 Live Oak, VIII, 26, 1911, (R. & H.), 2 ♂, 1 ♀.

The present geographic race is the southern development of *M. luridus*, and is found along the Atlantic coast as far north as Petersburg, Virginia. In the extreme southern Appalachians it is met with up to an elevation of about 2,000 feet, above which typical *luridus* is found.

This southern race is distinguished from *luridus* s.s. by its greater size, more attenuate form and smoother structure, by the subgenital plate of the male being longer in proportion to its width and by the ventral valves of the ovipositor of the female having the distal portions much longer and less curved, in fact nearly straight. Scudder gave the character of the subgenital plate in his description of *keeleri*, but wrongly contradicted himself in his key.

A much greater amount of genital variation, particularly in the shape of the cerci, is found in the present species than is usual in the genus *Melanoplus*. There is also much variation in size and coloration. The conclusion that the species increased regularly in size in southward distribution<sup>101</sup> must be somewhat modified, for although

<sup>101</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 297, (1907).

this is true to a moderate degree, the large amount of material now at hand shows that environmental differences have a more decided effect. The table of measurements gives the normal dimensions of material from different portions of the range of this race; certain series before us are decidedly smaller than is usual, this differentiation being apparently due to environmental conditions, this size reduction is shown by material from Macon, St. Simon's and Cumberland Islands, Georgia, and to a less extent in the series from Tybee Island, Georgia. In these series males average about 22 mm. and females about 26 mm. in length.

*Measurements (in millimeters).*

		Length of body.	Caudal width of pronotum.	Length of tegmen.	Length of caudal femur.
♂ ♂					
Winter Park, N. C.	(6) <sup>102</sup>	23.5-25.7	2.9-3	18-19.4	12.8-14.8
Currahee Mountain, Ga.	(8)	20.1-23.8	3-3.3	18-19.2	13.6-14
Jesup, Ga.	(4)	22.3-23	2.8-3	18.2-19.9	13.7-14.3
Atlantic Beach, Fla.	(10)	19.4-27.2	2.8-3.4	18-21.4	13-15.1
Miami, Fla.	(13)	23-24.9	3.1-3.3	21.2-22.8	15-15.3
Dallas, Texas.	(1)	25	3.3	20	15.2
Houston, Tex.	(1)	25.6	3.3	19	14.8
♀ ♀					
Winter Park, N. C.	(11)	28.2-32.5	3.8-4.1	20-22.3	15-17.7
Currahee Mountain, Ga.	(3)	25.8-28.7	4-4.2	19.4-21.7	15.8-16.8
Jesup, Ga.	(4)	26.3-30.3	3.8-4.6	20.4-24	15.4-17.4
Atlantic Beach, Fla.	(8)	29-29.9	4-4.5	21.7-23	17.5-18.2
Miami, Fla.	(13)	29.6-35.5	4.1-4.4	23.5-26	17.3-18.8
Houston, Tex.	(1)	30.7	4.3	21.4	16.9

The synonymy of Scudder's *M. deletor* with the present insect has been discussed and established by the authors.<sup>103</sup>

Many of the specimens here recorded are very dark in general coloration, with the lighter areas of the caudal femora cinnamon color and very striking; the series from Winter Park, North Carolina, composed wholly of such specimens, is particularly brilliantly marked. A few pale brown specimens have the markings of the caudal femora subobsolete and suggest in appearance large and very heavy specimens of *M. femur-rubrum*.

**Melanoplus furcatus** Scudder.

Billy's Island, Georgia, VI-VII, 1912; IX, 1-5, 1913, (J. C. Bradley), 1 ♂, 4 ♀, 2 juv. ♂.	Jordan's, Billy's Island, Ga., VIII, 31, 1913, (J. C. Bradley), 1 juv. ♀. Honey Island, Ga., VI, 1912, (J. C. Bradley), 1 juv. ♂.
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<sup>102</sup> The figures in parentheses indicate the number of specimens measured from each locality.

<sup>103</sup> PROC. ACAD. NAT. SCI. PHILA., 1907, p. 296, (1907).

In addition to the above specimens we have before us the previously unique male and female, from Jacksonville, Florida, on which the species was based. The Okefenokee females are of similar size to the Jacksonville one, but the single Billy's Island male is somewhat smaller than the type, its measurements being: length of body, 30 mm.; length of pronotum, 7.3; length of tegmen, 19.2; length of caudal femur, 17.8. In coloration there is considerable individual variation in the pale areas, one female having these more ochraceous than the others, while one of the same sex has the same areas appreciably rufous brown. The male and one of the females from Billy's Island were taken in coitu. The single immature example from Billy's Island taken in June, and that from Honey Island taken the same month, are in the same instar, while those from Billy's Island taken in July and Jordan's, August 31, are in a more advanced stage. The forking of the male cerci is indicated in all of the young, although the difference between the two stages is in this respect very appreciable. The July immature specimen is quite generally blackish, but the June and August ones are of a strongly contrasted pattern with the pale areas on the dorsum of the head and pronotum quite rufescent.

**Melanoplus clypeatus** Seudder.

Sandfly, Georgia, IX, 3, 1911, (R. & H.), 2 ♂, 2 ♀.

This rare species was found in the heaviest undergrowth in gray-bark pine woods, in more or less swampy situations. Specimens were very scarce, even when thorough search was made for them. The males, when disturbed, jumped or flew several feet, but the females were more sluggish.

In size the series before us, three males and five females, shows little individual variation, while in color we find one condition much paler and more ochraceous than another. This pale condition is represented by one of the original "Georgia" males, now in the Hebard Collection ex Bruner, a female from Thomasville, Georgia, and one of the same sex from Sandfly. The degree of paleness of the anal area of the tegmina is about equal in this species and *furcatus*, varying somewhat in each. The females of these two species are rather difficult to distinguish, but the more robust and less elongate caudal femora of *clypeatus* will serve to separate the two.

Sandfly and Thomasville, Georgia, are the only exact localities from which the species is known, it originally having been described from Georgia without more exact information.

**Melanoplus femoratus** (Burmeister).*Maryland.*

Glen Echo, VII, 10, 1914, (H.), 1 ♂.  
 Washington, D. C., VIII, 6, 1 ♂,  
 [Hebard Cln.].

*Virginia.*

Arlington, VII, 9, 1914, (H.), 6 ♂.  
 Fredericksburg, VII, 20, 1913, (R. &  
 H.), 2 ♂, 3 ♀.

Lynchburg, VII, 22, 1913, (R. & H.),  
 2 ♀.

Petersburg, VII, 23, 1913, (R. & H.),  
 2 ♂, 2 ♀.

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.),  
 2 ♀.  
 Charlotte, VII, 27, 1913, (R. & H.),  
 1 ♀.

The range of this species is now known to extend eastward to the coast in Virginia (Virginia Beach), but in North Carolina it has not been taken lower than Raleigh, while in Georgia it is only known from elevated localities in the northern part of the State (Sand Mountain and Blue Ridge).

The species was scarce everywhere and was found in the moist situations usually frequented, while at Fredericksburg it was also encountered on rather barren hillsides.

**Melanoplus punctulatus punctulatus** (Seudder).*Maryland.*

Cabin John Run, VIII, 1907, (W. Palmer), 1 juv. ♂, [U. S. N. M.].  
 Near Plummer's Island, X, 31, 1915,  
 (W. Stone; in oak woods, few pines),  
 1 ♂, 1 ♀, [A. N. S. P.].  
 Washington, District of Columbia, IX,  
 23, 1908, (A. N. Caudell), 1 ♂,  
 [U. S. N. M.].

*Virginia.*

Falls Church, X, 13, 1 ♂, 1 ♀, [U. S.  
 N. M.].

*Georgia.*

Thompson's Mills, X, 1909, (H. A. Allard), 1 ♂, [U. S. N. M.].

Through the kindness of Mr. Franklin Sherman Jr., we have been able to examine previously recorded material of this form from Blantyre (IX, 1906; R. Woglum, 1 ♂) and Raleigh (X, 1907-XI, 1908; F. Sherman Jr., 1 ♂, 1 ♀), North Carolina. The Blantyre specimen is perfectly typical *punctulatus*, while the Raleigh material shows a faint approach toward *punctulatus arboreus* in the slightly greater thickening of the tubercle of the male subgenital plate. The Raleigh specimens are, however, clearly true *punctulatus*. We have made a careful study of all the available material of *punctulatus* and *arboreus*, some thirty-five specimens in all, and are convinced that Seudder's suggestion that *arboreus* might be only a geographic race of *punctulatus* is correct. Aside from the larger size of the southern specimens, the only constant, easily appreciated character which we can find to separate the two forms is, that in *p. punctulatus* the tubercle of the male subgenital plate is smaller, less produced and thinner, while in *p. arboreus* the same structure is larger, more distinctly produced and thicker and more inflated. The metazona of the pro-

notum, particularly in the male sex, is apparently more transverse and less distinctly longitudinal in *p. arboreus* than in *p. punctulatus*, and the caudal margin of the same area is more broadly obtuse-angulate. The exact form of the male cerci shows so much variation in the available males of *punctulatus punctulatus*, that we do not feel justified in attempting to give the differences in this structure between the series of the typical form and the very few male individuals of *p. arboreus*. The form of the subgenital plate, however, is quite constant as far as the material before us goes.

The following measurements (in millimeters) show the regular increase in size southward in typical *punctulatus* and the race *arboreus*:

<i>M. p. punctulatus.</i>	Length of body.	Length of pronotum.	Length of tegmen.	Length of caudal femur.
♂				
De Grassi Point, Ontario. . .	18.5	4.6	16.4	11.3
Bellasyva, Pennsylvania . .	21.5	5	18	12
Blantyre, N. C. . . . .	24.6	5.3	22	13.3
Raleigh, N. C. . . . .	24	5.5	17	13
♀				
De Grassi Point, Ont. . . . .	29.5 <sup>104</sup>	5.6	18.8	11.9
Bellasyva, Pa. . . . .	27.6	5.5	19.3	12.8
Safford's Forge, New Jersey	29	6	20	14.4
Virginia . . . . .		6.3	21.3	14.8
Raleigh, N. C. . . . .	35.3	6.1	21.9	14.9
<i>M. p. arboreus.</i>				
♂				
Lake Drummond, Va. . . . .	29.4	6.3	26.2	15.6
Dallas, Texas. . . . .	27.2	6.2	22.3	15
♀				
Lake Drummond, Va. . . . .	27.4 <sup>105</sup>	6.9	19.5	15.3
Lake Drummond, Va. . . . .	36	8.9	30	19.3
Southern Pines, N. C. . . . .	38.7	8.5	26.6	18.5
Walton County, Florida. . . .	35.5	8.2	26	18.4

The distribution of typical *punctulatus*, in the east at least, seems to be restricted to the Boreal, Transition and Upper Austral zones, intergrading with *p. arboreus*, which is an Austroriparian form. The Blantyre and Raleigh records are the most austral known to us from the eastern States.

***Melanoplus punctulatus arboreus* Scudder.**

*Virginia.*

Lake Drummond, Disnal Swamp, X,  
29, 1906, (H. S. Barber), 1 ♂, 2 ♀,  
[U. S. N. M.].

*Georgia.*

Vicinity of Stone Mountain, VIII, 3,

1913, (J. C. Bradley), 1 juv. ♀, [Heb-  
ard Cln.].

*Florida.*

Walton County (taken from stomach  
of turkey killed in pine forest), 1 ♀,  
[U. S. N. M.].

<sup>104</sup> Abdomen greatly extended in this specimen.

<sup>105</sup> Abdomen greatly shrunken in this specimen.



These records and that from Southern Pines, North Carolina, given by Sherman and Brimley,<sup>106</sup> of which the material is now before us, are the only ones known for the race from east of the Mississippi. The Lake Drummond male is perfectly typical of the form, one of the females is very small, in addition with its abdomen greatly contracted, but we should consider it referable to *p. arboreus*, while the other female is extremely large, in fact on the whole the largest specimen from the east we have seen. It is possible that difference of environment is responsible for the variation in these two females, or the occasional instability of a form near the margin of its range. The Dismal Swamp locality being so peculiar in itself, representing nearly the extreme Austroriparian district in the east, as well as a strongly marked accentuation of the same type of environment, we may find an explanation of this variation in the supposition that the smaller individual would represent the normal-sized insect for the geographic position of the locality, considering the regular increase in size southward of the species, while the larger ones would represent a decided response to the abnormally pronounced tendencies of the region.

The Stone Mountain individual is quite suffused with rufescent, which strongly colors the pale areas. It was taken in a dusty road bordered on each side by heavy pine woods.

***Paroxya atlantica atlantica* Scudder.**

1898. *Paroxya scudderi* Blatchley, Can. Ent., XXX, p. 59. [Millers, Lake County and Tolleston, Indiana.]

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.),  
1 juv. ♀.  
Fayetteville, IX, 9, 1911, (R. & H.),  
1 ♀.  
Wilmington, IX, 8, 1911, (R. & H.),  
1 ♀.  
Winter Park, IX, 7, 1911, (R. & H.),  
8 ♂, 5 ♀.  
Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.),  
13 ♂, 6 ♀.  
Sumter, V, 30, 1914, (W. Stone), 3 ♂,  
1 ♀, 1 juv. ♂, [A. N. S. P.].  
Manning, V, 23 and 28, 1914, (W. Stone), 2 ♂, 4 juv. ♂, [A. N. S. P.].  
Sullivan Island, IX, 5, 1911, (R. & H.), 1 ♂, 1 ♀.

Yemassee, IX, 4, 1911, (R. & H.),  
10 ♂, 8 ♀.

*Georgia.*

Tybee Island, IX, 2, 1911, (H.), 4 ♂,  
2 ♀.  
Sandfly, IX, 3, 1911, (R. & H.), 2 ♂,  
1 ♀.  
Jesup, IX, 1, 1911, (R. & H.), 10 ♂,  
2 ♀; XII, 1908, (H.), 1 ♂.  
Brunswick, VIII, 30, 1911, (H.), 2 ♂,  
2 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 2 ♂, 1 ♀.  
Suwannee Creek, VIII, 28, 1911, (R. & H.), 1 juv. ♀.  
Mixon's Hammock, Okefenokee  
Swamp, V, 16, 1915, (H.), 1 ♂, 1 ♀.  
Billy's Island, VI, VII, 1912, (J. C. Bradley), 5 ♂, 4 ♀, 3 juv. ♂,  
1 juv. ♀.

<sup>106</sup> Ent. News, XXII, p. 389, (1911).

Homerville, VIII, 27, 1911, (R. & H.),  
4 ♂, 3 ♀.

Albany, VIII, 1, 1913, (R. & H.), 1 ♂,  
1 ♀, 1 juv. ♂.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
4 ♂; IX, 7, 1913, XI, 5, 1911, (W. T.  
Davis), 1 ♂, 2 ♀.

Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 9 ♂, 2 ♀.

Pablo Beach, IX, 5, 27, 1913, (W. T.  
Davis), 3 ♂, 3 ♀.

Indian River, (T. J. Priddey), 1 ♀,  
[Hebard Cln.].

In conjunction with the above material, we have carefully studied the very large series of the species already recorded and in our collections, representing localities from Indiana and New Jersey to extreme southern Florida.

Examination of paratypes of *P. scudderi* and study of Blatchley's original description of that insect show that the most important characters given by Blatchley to separate *scudderi* from *atlantica* are size, antennal and cercal length and shape of the furcula. The first three of these characters are shown by the appended table of measurements to be decidedly variable in the species, and too unstable to be considered of even racial significance, while the shape of the furcula is shown by the material before us to afford no recognizable differences.

Blatchley's species consequently falls, for although the present insect shows that other geographic races are probably in the process of formation, none of these, excepting *P. a. paroxyoides*, has as yet reached a sufficient differential development to be conscientiously recognized. An effort to describe the more pronounced of these formative races would only create unnecessary confusion. Many other species, among which are *Ctinocephalus elegans*, *Chortophaga viridifasciata* and *Pardalophora phænicoptera*, demonstrate incipient racial development which has not as yet reached a stage where such can be properly recognized and geographic races described.

*Measurements (in millimeters) of extremes.*

♂	Length of body.	Length of antenna.	Length of pronotum.	Length of tegmen.
Lake County, Indiana.....	17-17.4	8.5- 8.8	4.2-4.6	11-12.2
Stafford's Forge, New Jersey.....	18.8-19.6	9.5-10	4.5-4.6	11-11.2
Winter Park, N. C. ....	20.4-21.7	10-13.2	4.7-5.1	13.2-14.7
Jesup, Ga. ....	21.8-24	10.7-11.5	4.9-5.6	14.5-17.4
Atlantic Beach, Fla. ....	21.2-25	11-12.8	5-5.8	15.3-18.3
Miami, Fla. ....	15.7-19	8.4-10	3.6-4.4	13-15.9

♂	Width of tegmen.	Length of caudal femur.	Width of caudal femur.	Length of cercus.
Lake County, Indiana	2.2-2.3	10.8-11	2.4-2.5	1.6-1.8
Stafford's Forge, New Jersey	2.2-2.4	10.2-10.6	2.5-2.6	1.5-1.8
Winter Park, N. C.	2.7-3	11.7-14.7	2.9-3.3	1.7-1.8
Jesup, Ga.	3-3.2	12.5-14.2	3-3.4	1.9-2
Atlantic Beach, Fla.	2.8-3.5	12.9-14	3.3-3.4	1.8-2
Miami, Fla.	2.1-2.4	10.6-11.5	2.6-3	1.5-1.7

The females show a similar variability, which demonstrates that examples from the most northern localities in the distribution of the insect are smaller, with shorter tegmina and wings, the increase in size in the southward distribution reaching its maximum in southern Georgia and northern Florida. Southward in Florida a considerable decrease in size, accompanied by a general attenuation of form, is found, specimens from the mainland of extreme southern Florida being the smallest and most attenuate of any before us, with proportionately the longest tegmina and wings. A well-defined geographic race, *P. a. paroxyoides*, occupies the Florida Keys.

Although dark individuals are present in all of the series before us, we find the material from the coast of the Carolinas and Georgia to be more yellow in general coloration than is usual in specimens from other portions of the range of the species. Such specimens were noticed to be particularly brilliant in life, and showed a very close parallelism in color and markings to *Melanoplus australis*, with which insect the present species was often found. In life *Melanoplus australis* is one of the most brilliantly colored species of that very large genus.

This insect prefers moist spots, usually in forest undergrowth or on the margins of swamps and marshes. It was found common in an open glade covered with grasses over a foot in height (Florence), particularly in the drier portions of the salt-marsh margin (Tybee Island), about the edges of a wet depression in pine woods (Winter Park, Jesup), at the first of these localities associated with *Melanoplus decorus*, and in a heavy tangle of vegetation in a cabbage palmetto "hammock" (Atlantic Beach). The species was occasional in swamp grasses along a heavily wooded "branch" (Fayetteville) and scarce in strand plants (Cumberland Island), in low bog vegetation through the long-leaf pine woods (Homerville), in low vegetation and grasses near swamp (Mixon's Hammock) and in a cypress swamp (Jacksonville).

The present species is known on the Atlantic coast from Jamesburg and Lakehurst, New Jersey, southward to the extreme southern por-

tion of the mainland of Florida. Its westward distribution does not extend as far inland as the fall line, but south of this barrier in Georgia and the Gulf States and along the Gulf coast it is found west of the area treated in the present paper and has been taken in the Mississippi valley region within half a mile of the shores of Lake Michigan.

***Paroxya clavuliger* (Serville).**

*Paroxya floridiana* of Thomas and authors.

- |  |   |
|--|---|
| Washington, D. C., VIII, 1883, 2 ♂, 1 ♀, [Hebard Cln.].    | Warm Springs, VII, 18, 1913, (J. C. Bradley), 1 ♂.              |
| Virginia.  | Tybee Island, IX, 2, 1911, (H.), 5 ♂, 1 ♀.                      |
| Petersburg, VII, 22, 1913, (R. & H.), 1 juv ♂, 1 juv. ♀.   | Jesup, IX, 1, 1911, (R. & H.), 1 ♂, 2 juv. ♀.                   |
| Newport News, IX, 16, 1907, (B. Long), 1 ♀, [A. N. S. P.]. | Hebardville, V, 15, 1915, (H.), 1 small juv. ♂, 2 small juv. ♀. |
| North Carolina.  | Mixon's Hammock, V, 16, 1915, (H.), 1 small juv. ♂.             |
| Fayetteville, IX, 9, 1911, (R. & H.), 3 ♂, 2 ♀.            | Billy's Island, VI, 1912, (J. C. Bradley), 1 ♀.                 |
| Wrightsville, IX, 7, 1911, (R. & H.), 2 ♂, 3 ♀.            | Florida.  |
| Georgia.   | Jacksonville, IX, 1913, (W. T. Davis), 3 ♂, 2 ♀.                |
| Buckhead, VIII, 2, 1913, (R. & H.), 2 ♂, 2 juv. ♀.         | Atlantic Beach, VIII, 24, 1911, (R. & H.), 2 ♂, 8 ♀.            |
| Augusta, VII, 29, 1913, (R. & H.), 1 juv. ♀.               | Pablo Beach, IX, 27, 1913, (W. T. Davis), 1 ♀.                  |

It is much to be regretted that Serville's description and figures of *Acridium clavuliger*<sup>107</sup> have so long been overlooked. There is not the least doubt that the present insect is the species which he described, and Thomas' *Caloptenus floridianus*, described in 1874,<sup>108</sup> has consequently been placed in the synonymy here.

Blatchley did not compare his *P. hoosieri* with the present species, to which it is very closely related. *P. clavuliger* differs in having the furcula less heavy and usually more widely separated, and the subgenital plate with the lateral portions of the caudal margin decidedly less elevated; still other differential characters appear to exist.

The material here recorded fully bears out the authors' previous assertion that the present species shows a marked increase in size southward in its distribution.<sup>109</sup> The distribution of the species is, to a certain degree, discontinuous, as it is scarcely ever met with except in boggy, swampy or marshy surroundings; it is particularly partial to such locations when situated in the open or along the borders of woods.

<sup>107</sup> *Hist. Nat. Ins.*, Orth., p. 676, pl. XIV, figs. 11a-b, (1839). [North America.]

<sup>108</sup> Bull. U. S. Geol. and Geogr. Surv. Terr., I, p. 68, (1874). [Florida.]

<sup>109</sup> Proc. Acad. Nat. Sci. Phila., 1907, p. 298, (1907).

The insect is found everywhere in favorable situations on those portions of the coastal plain treated in the present paper. It is uncommon on the Piedmont plateau and in that region has been found only at Appomattox, Virginia, and at Buckhead, Stone Mountain and Warm Springs, Georgia.

***Aptenopedes sphenarioides sphenarioides* Scudder.**

1877. *Aptenopedes rufovittata* Scudder, Proc. Bost. Soc. Nat. Hist., XIX, p. 85. (In part.) [Fort Reed, Florida.]

*Georgia.*

Jesup, IX, 1, 1911, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♀; XII, 1906, (H.), 3 ♂, 2 ♀, 1 juv. ♂.  
Brunswick, VII, 30, 1911, (H.), 6 ♂, 3 ♀.  
St. Simon's Island, VII, 30, 1911, (R. & H.), 1 juv. ♀.  
Cumberland Island, VII, 31, 1911, (R. & H.), 5 ♂, 1 juv. ♂.  
Suwannee Creek, VII, 28, 1911, (R. & H.), 2 juv. ♀.  
Billy's Island, VI, 1912, (J. C. Bradley), 3 ♂, 1 juv. ♀; XI, 5, 1913, (J. C. Bradley), 2 ♀, 1 juv. ♂, 2 juv. ♀.  
Jordan's, Okefenokee Swamp, VIII, 31, 1913, (J. C. Bradley), 1 ♀.  
Homerville, VII, 27, 1911, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀.

Albany, VIII, 1, 1913, (R. & H.), 2 juv. ♀.  
Bainbridge, IX-X, 1910, (J. C. Bradley), 1 ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.), 4 ♂, 1 ♀; VIII, 1885, (W. H. Ashmead), 3 ♂, 2 ♀, 1 juv. ♀, [Hebard Cln.]; XI, 3, 1911, (W. T. Davis), 7 ♂, 6 ♀.  
Atlantic Beach, VIII, 24, 1911, (R. & H.), 32 ♂, 8 ♀, 1 juv. ♂, 3 juv. ♀.  
Pablo Beach, IX, 5, 1913, (W. T. Davis), 2 ♂, 2 ♀, 1 juv. ♂, 1 juv. ♀.  
Live Oak, VIII, 26, 1911, (R. & H.), 1 ♀, 1 juv. ♂, 1 juv. ♀.  
Daytona, XI, 11, 1911, (G. P. Englehardt), 1 ♂, 1 ♀, [B. I.].

Disassociation of the sexes caused Scudder to describe three, instead of two, species at the time he erected the present genus. After describing *sphenarioides*, he described *rufovittata*, and then *aptera* from a single female. The second species is a combination of four adult males of *aptera* and three immature females of *sphenarioides*. We here select as single type of *A. rufovittata*, the only immature female of the type series of that species in the Scudder Collection (the others, from the Cornell University, having also been seen by us), and in consequence we place *rufovittata* in the synonymy under *sphenarioides*.

The specimens from Pablo Beach are the largest we have seen of the present form, being in length as follows: males 17-21.8, females 24.5-28 mm. This size is greatly exceeded in the southern race, *A. s. clara*. The smallest individuals before us are from Brunswick (male 15.4, female 20 mm.), the specimens from Jesup taken in December are also unusually small.

In the latitude of southern Georgia the species appears adult in the largest numbers not earlier than late August, and is found numerous in both adult and immature condition throughout the winter.



It is our opinion that although the majority of adults appear in the late fall, there are young reaching maturity in every month of the year.

The distribution of the present insect is known to extend from Savannah, Georgia, westward to Bainbridge, Georgia and De Funiak Springs, Florida, and southward to central Florida, where the southern race, *A. s. clara*, takes its place.

***Aptenopedes aptera* Scudder.**

*Georgia.*

Jesup, IX, 1, 1911, (R. & H.), 5 ♂, 6 ♀, 2 juv. ♀.  
Brunswick, VIII, 30, 1911, (H.), 4 ♂, 2 ♀.  
Cumberland Island, VIII, 31, 1911, (R. & H.), 1 juv. ♀.  
Suwannee Creek, VIII, 28, 1911, (R. & H.), 2 ♂, 1 ♀, 1 juv. ♂, 4 juv. ♀.  
Homerville, VIII, 27, 1911, (R. & H.), 4 ♂, 7 juv. ♂, 7 juv. ♀.  
St. Marys, III to IV, 1896, (O. Bangs), 1 ♀, [M. C. Z.].

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.), 3 ♂, 3 ♀, 4 juv. ♀; VIII, 1885, (W. H. Ashmead), 1 ♂, 2 ♀, [Hebard Cln.]; XI, 5, 1911, (W. T. Davis), 1 ♀.  
Atlantic Beach, VIII, 24, 25, 1911, (R. & H.), 3 ♂, 7 juv. ♀.  
Live Oak, VIII, 26, 1911, (R. & H.), 1 ♂.  
Newberry, IX, 18, 1911, (W. T. Davis), 1 ♀.  
Archer, 1882, 1 ♀, [Hebard Cln.].

This insect appears earlier in the year than does *A. sphenarioides*, though in different years its appearance seems to vary, as in mid-August of 1905 adults were found numerous in northern Florida, while in late August of 1911 adults were few but young numerous in the same region.

This species, like *A. sphenarioides*, is found widely distributed throughout the pine woods over its entire range; in Georgia and northern Florida these pines being usually of the long-leaf species, while in southern Florida they are the antillean pine, *Pinus caribæa*. At Brunswick it was found occasional in the adult condition on palmetto flats, while at Homerville immature individuals were very common but adults rare in a low area in the pine woods overgrown with a low heather-like plant, *Kalmia hirsuta*.

The present insect is known from Jesup to Homerville, Georgia, southward over peninsular Florida and on the keys at Big Pine Key.

**TETTIGONIIDÆ.**

***Arethæa phalangium* Scudder.**

Hebardville, Georgia, V, 15, 1915, (H.; undergrowth in pine woods), 1 juv. ♀.

This very scarce species is further represented in the series now under consideration by a single male from Augusta, Georgia, which specimen has recently been studied in a revisionary paper on the present genus.<sup>110</sup>

<sup>110</sup> See Rehn and Hebard, *Trans. Am. Ent. Soc.*, XL, pp. 146, 147, 148, (1914).

*Stilpnochlora marginella* (Serville).

Sanford, Florida, XI, 28, 1911, (G. P. Englehardt), 1 ♀, [B. I.].

Fort Myers and Lake Worth, Florida, are the most northern localities previously recorded for this species.

#### SCUDDERIA Stål.

We have recently fully treated the material of this genus in the present collections.<sup>111</sup> The localities for the collections here being studied are as follows:

*Scudderia curvicauda laticauda* Brunner.

Typical material. Wilmington and Winter Park, North Carolina; Yemassee, South Carolina; Mixon's Hammock, Billy's Island, Albany and Spring Creek, Georgia, and Jacksonville and Atlantic Beach, Florida.

Material approaching *S. curvicauda* s.s. Petersburg and Orange, Virginia; Weldon, Charlotte and Fayetteville, North Carolina; Spartanburg and Columbia, South Carolina, and Jasper, Currahee Mountain, vicinity of Stone Mountain, Warm Springs and Macon, Georgia.

*Scudderia texensis* Saussure and Pietet.

Wrightsville and Winter Park, North Carolina; Yemassee, South Carolina; Tybee Island, Jesup, Billy's Island, Honey Island, Tifton, Albany and Bainbridge, Georgia, and Jacksonville, Atlantic Beach and Live Oak, Florida.

In addition we now have 1 juv. ♂, Manning, South Carolina, V, 28, 1914, (W. Stone), [A. N. S. P.].

*Scudderia furcata furcata* Brunner.

Washington, District of Columbia; Fayetteville, Wrightsville and Lake Waccamaw, North Carolina; Yemassee, South Carolina; Rome, Stone Mountain, Isle of Hope, Albany and Spring Creek, Georgia, and Jacksonville, Florida.

A female of this species from Highlands, North Carolina, is now before us, which specimen has been incorrectly recorded as *S. cuneata* by Sherman and Brimley.

*Scudderia cuneata* Morse.

Fayetteville, Lake Waccamaw and Wrightsville, North Carolina; Florence, South Carolina; Sandfly, Brunswick and Billy's Island, Georgia, and Jacksonville, Florida.

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<sup>111</sup> *Trans. Am. Ent. Soc.*, XL, pp. 271-314, (1914).

**Symmetropleura modesta** Brunner.*North Carolina.*

State record, 1 ♂, [Hebard Cln.].  
 Raleigh, VIII, 8, 1905, 1 ♀, [U. S.  
 N. M.].

*Georgia.*

Billy's Island, VI, 1912, (J. C. Brad-  
 ley), 1 ♂.  
 Spring Creek, VI, 7-23, 1911, (J. C.  
 Bradley), 2 ♂.

*Florida.*

Fernandina, (W. H. Finn), 1 ♂,  
 [U. S. N. M.].  
 Atlantic Beach, VIII, 25, 1911, (R.),  
 2 ♀.  
 Crescent City, VI, 1 ♂, [U. S. N. M.].  
 Enterprise, V, 25, 1 ♂, [U. S. N. M.].

Quite decided size variation is shown by the material of this very scarce species now before us. The specimens from southeastern Georgia and northwestern Florida are exceptionally large, a condition which has been noted in material of numerous other species from that region.

The species was found in reeds in a marshy spot and was beaten from bayberry bushes, *Myrica cerifera*, at Atlantic Beach, while the specimen from Crescent City was found on orange trees.

The known distribution of the species is considerably extended by the above records.

**AMBLYCORYPHA** Stål.

The material of this genus found in the present collections has recently been fully studied by the authors.<sup>112</sup> The localities for the present collections are as follows:

**Amblycorypha oblongifolia** (De Geer).

Weldon, North Carolina.

**Amblycorypha floridana floridana** Rehn and Hebard.

Typical material. Jacksonville and Atlantic Beach, Florida.

Material intermediate between *floridana* s.s. and *floridana carinata*. Jacksonville, Florida; Billy's Island, Honey Island, Spring Creek and Isle of Hope, Georgia, and Yemassee and Ashley Junction, South Carolina.

The following specimens now before us probably represent the immature condition of such intermediates between the races of the present species:

Hebardville, Georgia, V, 15, 1915, (H.; undergrowth in pine woods), 1 juv. ♂.

Mixon's Hammock, Ga., V, 16, 1915, (H.; hammock undergrowth), 1 juv. ♀.

**Amblycorypha floridana carinata** Rehn and Hebard.

Petersburg, Virginia, and Silver Lake, Georgia.

<sup>112</sup> *Trans. Am. Ent. Soc.*, XL, pp. 315-340, (1914).

**Amblycorypha uhleri** Stål.

Fredericksburg, Virginia; Weldon, Goldsboro and Lake Waccamaw, North Carolina; Columbia and Yemassee, South Carolina; Currahee Mountain, Toxco, Jasper, Buckhead, Stone Mountain, Augusta, Isle of Hope, Sandfly, Brunswick, Macon, Albany and Spring Creek, Georgia, and Jacksonville, Florida.

**Amblycorypha rotundifolia rotundifolia** (Scudder).

Typical material. Spartanburg, South Carolina, and Tuckoluge Creek in Rabun County, Toxco and Currahee Mountain, Georgia.

In addition we now have 1 ♂, Black Mountain, North Carolina, VII, 1912, (W. Beutenmüller), [Davis Cln.].

Intermediates between *rotundifolia* s.s. and *rotundifolia parvipennis*. Winter Park, North Carolina, and Macon and Warm Springs, Georgia.

**Microcentrum rhombifolium** (Saussure).*Delaware.*

Delaware, 1 ♀, [A. N. S. P.].

*Maryland.*

Chestertown, VIII, 2-23, 1899-1909, (E. G. Vanatta), 6 ♂, 5 ♀, [A. N. S. P.].

*Virginia.*

Near Washington, D. C., IX, 2-X, 1, 1883, 1 ♂, 1 ♀, [Hebard Cln.].

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♀.

Ashley Junction, VIII, 15, 1913, (R.), 1 ♂.

*Georgia.*

Austell, VIII, 27, 1910, 1 ♂, [Ga. State Cln.].

Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♂, 1 ♀.

Cumberland Island, VIII, 31, 1911, (R. & H.), 1 ♂.

Spring Creek, (J. C. Bradley), 1 ♀, [Ga. State Cln.].

At Florence this insect was taken in an open area covered with grasses, while at Ashley Junction and Isle of Hope it was beaten from heavy undergrowth in pine woods, and secured in the same fashion from bayberry, *Myrica cerifera*, on Cumberland Island.

**Microcentrum retinerve** (Burmeister).*Maryland.*

Plummer's Island, VIII, 28 to X, 13, 1904 to 1906, (Caudell; McAtee; Fisher), 19 ♂, [U. S. N. M.].  
Washington, District of Columbia, IX, 24 to XI, 3, 1906 and 1907, (A. N. Caudell), 3 ♂, [U. S. N. M.].

*Virginia.*

Near Washington, D. C., X, 13, 1883, 1 ♂, 1 ♀, [Hebard Cln.].

*Georgia.*

Thompson's Mills, X, 1910, (H. A. Allard), 1 ♂, [U. S. N. M.].  
Bainbridge, (J. C. Bradley), 1 ♀, [Ga. State Cln.].

**Pterophylla camellifolia camellifolia** (Fabricius).*Cyrtophyllus perspicillatus* of authors.

1906, *Cyrtophyllus elongatus* Caudell, Jour. N. Y. Ent. Soc., XIV, figs. 37, 40. [Crawford and Fountain Counties, Indiana.]

*Maryland.*

Chestertown, VIII, 24, (E. G. Vantatta), 1 ♀, [A. N. S. P.].  
 Plummer's Island, VII, 16 to X, 1, 1905 to 1915, (Barber; Schwarz; Clemons; Fisher; McAtce), 9 ♂, 9 ♀, [U. S. N. M.].

*District of Columbia.*

Washington, IX, 15, 1909, (H. E. Ausherman), 1 ♂, [U. S. N. M.].  
 Pincy Branch, VIII, 15, 1905, (D. H. Clemons), 1 ♂, [U. S. N. M.].

*North Carolina.*<sup>113</sup>

Blowing Rock, 1902, (J. Willar), 1 ♀,

[A. N. S. P.]; VIII, 1907, (F. Sherman, Jr.), 1 ♀, [N. C. State Dept. Agr.].  
 Winston, VIII, 1906, (R. S. Wolgum), 1 ♀, [N. C. State Dept. Agr.].  
 Alamance County, VII, 1905, (F. Sherman), 1 ♀, [N. C. State Dept. Agr.].

*Georgia.*

Mountain City, VIII, 19, 1913, (J. C. Bradley), 2 ♂.  
 Thompson's Mills, (H. A. Allard), 1 ♂, [U. S. N. M.].

The name *Pterophylla* has been revived by W. F. Kirby,<sup>114</sup> and an examination of the original place of publication of the name<sup>115</sup> shows that it was proposed by W. Kirby for five species, one of which was *Locusta camellifolia* of Fabricius.<sup>116</sup> W. F. Kirby has selected this species as the type of the genus.

The names *camellifolia* and *perspicillata*, one based on the female sex and the other on the male sex, were proposed by Fabricius on the same page, the former having line priority. In consequence it is necessary to use the name standing first.

***Pterophylla camellifolia intermedia* (Caudell).***Cyrtophyllus intermedius* of Caudell.

Examination of the types and a single male before us from South Carolina leads us to believe that Caudell's *intermedius* is the southern race of *camellifolia*. The specimen from South Carolina is nearly intermediate in character between the two conditions, the ventral fork of the cercus not being as short, and the mesal production not as decided, as in the types of this race. In this specimen the tegmina are long and the enlargement of the distal portion of the subgenital plate is greater than in *camellifolia* s.s. (greatest width 2.6 mm.).

In the heavily forested areas bordering the rivers of the southeastern United States we have at night often heard a species of the present genus. The song was much quicker and sharper than that of the

<sup>113</sup> Although all of the specimens from this State here recorded are females, we have before us previously recorded males from Raleigh, which show the material from this region, at least from above the fall line, to be typical *camellifolia*.

<sup>114</sup> *Syn. Cat. Orth.*, II, p. 343, (1906).

<sup>115</sup> Kirby and Spence, *Introd. Ent.*, II, p. 218, (1828).

<sup>116</sup> *Syst. Ent.*, p. 283, (1775).



northern insect, and these individuals probably belonged to the present form.<sup>117</sup>

**Belocephalus subapterus** Seudder.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂,  
2 juv. ♂, 1 juv. ♀.  
Ashley Junction, VIII, 15, 1913, (R.),  
1 juv. ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
4 ♂, 2 juv. ♂, 7 juv. ♀.

*Georgia.*

Savannah, VIII, 14, 1903, (A. P.  
Morse), 1 juv. ♂.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
2 ♂, 3 ♀, 1 juv. ♀.  
Sandfly, IX, 3, 1911, (R. & H.), 2 ♂,  
1 ♀, 2 juv. ♀.  
Jesup, IX, 1, 1911, (R. & H.), 1 juv. ♂.  
Brunswick, VIII, 30, 1911, (H.),  
1 juv. ♂.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 1 juv. ♂.  
Billy's Island, IX, 1-5, 1913, (J. C.  
Bradley), 1 juv. ♂; XII, 23, 1913,  
(J. C. Bradley), 8 ♂.

Homerville, VIII, 27, 1911, (R. & H.),  
1 juv. ♀.  
Thomasville, XII, 18, 1908, (H.), 2 ♂.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
1 juv. ♀; XI, 6, 1911, (G. P. Engle-  
hardt), 1 ♀, [B. I.].  
Atlantic Beach, VIII, 24, 1911, (R. &  
H.), 2 ♂, 2 ♀, 2 juv. ♂, 1 juv. ♀.  
Hastings, (A. J. Brown), 3 ♂, 3 ♀,  
1 juv. ♂, 1 juv. ♀.  
Williston, I, 9, 1893, (M. H. Barton),  
1 ♂, [U. S. N. M.].  
Sanford, X, 24, 1889, (W. A. Gould),  
1 ♀, [U. S. N. M.].  
Orlando, (A. Haden), 1 ♀, [Hebard  
Cln.].  
Fort Drum, 1 ♀, [Hebard Cln.].  
Live Oak, VIII, 26, 1911, (H.), 1 ♀.  
Tallahassee, VIII, 8, 1903, (A. P.  
Morse), 1 juv. ♂.

*Measurements (in millimeters) of extremes.*

	Length of body.	Produc- tion of vertex beyond eye.	Ventral length of fastigium of vertex.	Length of pronotum.	Length of caudal femur.
♂					
Florence, S. C.	25.3	2.9	1.9	6.9	14.7
Yemassee, S. C.	24.6-26.3	2.7-2.8	1.7-2	6.5-6.9	13.3-14.3
Sandfly, Ga.	27.4-29.7	3 -3.2	2.4-2.2	7-7.2	15-15.1
Billy's Island, Ga.	23.8-27.3	2.5-3	1.7-2.1	6.2-7.7	13.1-15.8
Thomasville, Ga.	24.5-24.7	2.4-2.6	1.6	6.3-7.3	13.5-15.1
Atlantic Beach, Fla.	32.3-36.1	3.3-4	2.3-3.2	7.8-8.3	16.1-18.8
♀					
Live Oak, Fla.	37.3	4	3.1	8.7	18.8

These measurements show that scarcely any size variation may be correlated with the northern and southern distribution of this insect. Material from the region about Jacksonville (including Atlantic Beach and Pablo Beach) is the largest we have ever seen; this has been found to be true in the case of a number of other species and is apparently due to environmental conditions. The series from the not distant Billy's Island in the Okefenokee Swamp

<sup>117</sup> Caudell records a specimen of what he considered *elongatus*, which we find to be a synonym of *camellifolia*, as taken when stridulating "a higher quicker note." The unquestionable status and full distribution of *intermedia* will only be known when much larger collections of these insects have been made.

averages the smallest of any before us, the average being nearer the minimum measurements given above.

The material before us shows the vertex to be variable in the present insect, both in degree of production and shape. The vertex ranges from a produced form in which the apical spine is long and nearly straight, to one in which the vertex is decidedly less produced with the apical spine short and strongly uncinat. The former type is most decided in material before us from Live Oak and the region about Jacksonville, while the specimens from Thomasville represent the most decided development of the latter type.

The majority of specimens before us are, apparently irrespective of sex, of the green color phase. In the brown color phase the latero-dorsal lines of the pronotum are more pronounced.

The present species is one of the latest to appear; in southern Georgia adults are present in the greatest numbers probably early in December, at which time the first killing frosts usually occur. Davis has found the closely related *B. rehni* apparently hibernating in winter in northeastern peninsular Florida.

The above records considerably extend the known range of the species both northward and southward. The material before us was taken in an open spot in the pine woods covered with high grass (Florence), in wet spot in pine woods (Ashley Junction), in gray-bark pine woods in heavy undergrowth of green plants and vines (Isle of Hope and Sandfly), on a young cabbage palmetto (Thomasville), in a palmetto "hammock," in a tangle of raspberry and grape vines and other plants (Atlantic Beach), in a small clump of ground oak on the side of a sink hole (Live Oak) and on pineapple (Orlando).

***Belocephalus davis*** new species.

The present species, which we take pleasure in naming after the devoted student of this genus, Mr. William T. Davis, is related more closely to *B. sabalis* and *B. sleighti* than to the other species of the genus. It is a large insect, nearly as robust as the two species mentioned above, but agrees with the otherwise very different *B. subapterus* in having similar black markings on head, antennæ and pronotum.

Nearest affinity to *sabalis* and *sleighti* is shown by the supra-anal plate, which in these species only is very deeply emarginate mesad. This deep emargination is usually constant in form and distinctive in these species; in *sabalis* it has the sides straight with angle acute, the lateral productions formed by this emargination have evenly converging sides with acute apex situated mesad;

in *sleighti* this emargination is extremely deep and has the sides concave with angle not acute, but rather narrowly rounded, the lateral productions thus formed have sharply acute apices, which, however, are situated on their outer margins, due to the convexity of their inner margins; in *davisi* the emargination is not quite as deep as in *sleighti*, with the sides convex and angle very broadly rounded, the lateral productions formed by this emargination have evenly converging sides with blunt and sharply rounded apex situated mesad. The supra-anal plate in the other species of the genus, with distal margin very broadly and shallowly concave, is very distinct.

TYPE: ♂; Billy's Island, Okefenokee Swamp, Georgia. September 1-5, 1913. (J. C. Bradley.) [Hebard Collection, Type No. 156.]

*Description of Type.*—Size large for the genus, form robust, but not as decidedly robust as in *sabalis* and *sleighti*. Head in form much as in those species, but with ventral portion not as broad; not immaculate as in those species, but agreeing with the other species of the genus in having the ventral margin of the face above the clypeus broadly banded with black, and with the base of the antennæ margined ventrad, and the dorsal surface of the fastigium of the vertex lined laterad, with the same color. Antennæ with proximal joints marked with black, these markings becoming fainter distad and disappearing at the end of the proximal third. Pronotum with dorsum more constricted than in *sabalis* and *sleighti* and striped latero-dorsad with black. Tegmina as in those species. Supra-anal plate deeply emarginate mesad with sides convex and angle broadly rounded, the lateral productions formed by this emargination having evenly converging sides, but with apex blunt and sharply rounded. Cerci and subgenital plate as in *sabalis* and *sleighti*, limbs and armament of the same similar, but decidedly less robust; unlike in those species the limbs are marked with fine black punctæ on the more exposed surfaces.

*Allotype:* ♀; Same data as the type, but taken on December 28, 1913. [Hebard Collection.]

*Description of Allotype.*—Size somewhat larger than type, form similar. Head broader, more inflated than in females of *subapterus*; antennæ similar. Pronotum more inflated than in type, but, as in the other species of the genus, the latero-dorsal stripes are in this sex no further separated caudad than cephalad. Tegmina very small and pad-like and wings not visible, as in females of the other species of the genus. Supra-anal plate triangularly produced with sides concave and apex acute. Ovipositor slightly shorter than

caudal femur, heavy proximad and tapering gently, and with a very weak dorsad curvature, to the sharp, unarmed apex. Subgenital plate large, lateral margins produced in long, slender spines which are subparallel and lie along the shaft of the ovipositor. General color brown with black markings as in the type.

Ten paratype males bearing the same data as the type are before us.

*Measurements (in millimeters).*

	TYPE. ♂	Paratype ♂♂	Allotype. ♀
Length of body.....	34.3	32.9-40.3	36
Length of vertex.....	3.8	3.7- 4.5	4.1
Vertex from tooth to apex.....	2.6	2.6- 3.6	3.4
Length of pronotum.....	8.3	7.9- 8.9	8.1
Length of tegmen.....	6	5.6- 7.1	2.3
Length of caudal femur.....	16.4	16.7-18.8	18.4
Length of ovipositor.....			19.2

As in the other species of the genus of which we have a number of specimens, a considerable amount of size variation is present in this insect. There is also a decided amount of variation in the shape of the supra-anal plate in the above examples, though material of *sleighti* and *sabal* is constant in this respect, and, although in none of the paratypes is the median emargination as deep as in *sleighti*, the form of this emargination, and of the lateral productions thus formed, is in one of the paratypes similar to the type found in that species, and in several others is intermediate in character.

Four male paratypes and the female allotype are of the brown color phase, the other six specimens, male type and paratypes, are green.

The males were taken at night by Dr. Bradley, when they were found in numbers stridulating in the undergrowth of the pine woods.

In addition to this material we have before us a dried alcoholic pair taken by R. A. Mills at Chuluota, Florida, and now in the United States National Museum.

***Pyrgocorypha uncinata* (Harris).**

*Arkansas.*

Hot Springs, IV, 1906, (C. S. Hebard),  
1 ♂, [Hebard Cln.].

*Georgia.*

Thompson's Mills, IX, 1909, (H. A.  
Allard), 1 ♀, [U. S. N. M.].  
Bainbridge, (J. C. Bradley), 1 ♀.

The specimen from Hot Springs was taken in a hotel where it had been attracted by the lights at night, with it several examples of *Neoconocephalus triops* (*mexicanus* of most authors) were taken.

**NEOCONOCEPHALUS** Karny.

The authors have recently studied the species of this genus found in North America north of the Mexican boundary.<sup>118</sup> The material from the region at present under consideration is there treated in full. We give below the localities for this material.

***Neoconocephalus exiliscanorus*** (Davis).

Washington, District of Columbia, and Rosslyn and Clarendon, Virginia.

The species has also been recorded in the region under consideration from Raleigh, North Carolina, and Thompsons Mills, Georgia.

***Neoconocephalus melanorhinus*** (Rehn and Hebard).

Ocean City, Maryland.

***Neoconocephalus robustus crepitans*** (Scudder).

Chesapeake Beach, Somerset Heights, Plummer's Island, Maryland; Washington, District of Columbia; Herndon, Clarendon, Oceanview and Virginia Beach, Virginia; Tarboro, Raleigh, Salisbury, Southern Pines and Wrightsville, North Carolina; Columbia and Denmark, South Carolina; Atlanta, Augusta, Tybee Island and Albany, Georgia, and Atlantic Beach and Hastings, Florida.

***Neoconocephalus caudellianus*** (Davis).

Yemassee, South Carolina, and Billy's Island, Georgia.

***Neoconocephalus velox*** Rehn and Hebard.

Billy's Island, Georgia.

***Neoconocephalus retusus*** (Scudder).

Laurel and Plummer's Island, Maryland; Washington and Anolostan Island, District of Columbia; Rosslyn, Falls Church and Roanoke, Virginia; Fayetteville, Wrightsville and Winter Park, North Carolina; Florence, South Carolina; Atlanta, Albany, Bainbridge and Fargo, Georgia, and South Jacksonville and Daytona, Florida.

***Neoconocephalus triops*** (Linnaeus).

*Conocephalus mexicanus* and *fusco-striatus* of recent authors.

Washington, District of Columbia; Hampton and Virginia Beach, Virginia; Fayetteville, North Carolina; Florence and Yemassee, South Carolina; Atlanta, Jesup, St. Simon's Island, Cumberland Island, Billy's Island, Thomasville and Bainbridge, Georgia, and Jacksonville, Hastings and Daytona, Florida.

<sup>118</sup> *Trans. Am. Ent. Soc.*, XL, pp. 365-413, (1915).



**Homorocoryphus malivolans** (Seudder).

Tappahannock, Virginia, VII, 13 to VIII, 1, 18, 1915, (H. Fox), 29 ♂, (G. P. Englehardt), 1 ♀,<sup>119</sup> [U. S. N. M.], 12 ♀, [Fox Chn.].

From the area covered by the present paper, the species has previously been recorded only from the single specimen from Wilmington, North Carolina. It, however, probably occurs in the tidal marshes of the Atlantic coast, from southern Florida northward as far as the Virginia locality given above.

This interesting species was found by Dr. Fox quite frequent in the dense growth of tall reeds, *Spartina cynosuroides*, in a tidal marsh.

**ORCHELIMUM** Serville.

The material of this genus in the collections before us has recently been fully treated by the present authors.<sup>120</sup> The localities from the collections here being studied are as follows:

**Orchelimum agile** (DeGeer).

Chestertown, Cedar Point and Hyattsville, Maryland; Washington, D. C.; Rosslyn, Addison, Appomattox and Virginia Beach, Virginia; Hamlet, Wilmington, Winter Park, Wrightsville and Lake Waccamaw, North Carolina; Yemassee, South Carolina; Thompson's Mills, Stone Mountain, Savannah, Jesup, Tybee Island, Cumberland Island, Hebardville and Albany, Georgia, and Jacksonville, South Jacksonville, Ortega, Atlantic Beach, Pablo Beach, Live Oak, Carrabelle, Marianna, Quincy, Hastings and Sanford, Florida.

**Orchelimum glaberrimum** (Burmeister).

Virginia Beach and Cape Henry, Virginia; Raleigh, Goldsboro, Fayetteville, Smithville, Wilmington, Wrightsville and Lake Waccamaw, North Carolina; Florence, Ashley Junction and Yemassee, South Carolina; Macon, Savannah, Tybee Island, Groveland, Jesup, Billy's Island, Homerville and Albany, Georgia, and South Jacksonville, Atlantic Beach, Pablo Beach, Hastings and La Grange, Florida.

**Orchelimum vulgare** Harris.

Chestertown, Maryland; Washington, D. C.; Falls Church, Dryden, Norfolk and Wytheville, Virginia; Edenton, Raleigh, Blowing Rock, Blantyre and Linville, North Carolina, and Thompson's Mills, Georgia.

<sup>119</sup> This specimen has been previously recorded, as the synonymous *hoplomachus* Rehn and Hebard, by Sherman and Brimley.

<sup>120</sup> *Trans. Am. Ent. Soc.*, XLII, pp. 11-83, (1915).

*Orchelimum laticauda* Redtenbacher.

Tolchester, Hyattsville, Plummer's Island and Montgomery County, Maryland; Washington and Anolostan Island, D. C.; Rosslyn and Fredericksburg, Virginia; Weldon, Newbern and Lake Waccamaw, North Carolina; Florence, South Carolina; Thompson's Mills, Jesup and Billy's Island, Georgia, and Jacksonville, South Jacksonville, Ortega, Atlantic Beach and Sanford, Florida.

*Orchelimum minor* Bruner.

Maryland opposite Plummer's Island; District of Columbia; Raleigh and Sulphur Springs, North Carolina, and Thompson's Mills, Hoschton and Thomasville, Georgia.

*Orchelimum concinnum* Seudder.

Chestertown, Maryland; Oceanview and Virginia Beach, Virginia; Wrightsville and Smith Island, North Carolina; Tybee Island, Georgia, and Warrington and Fort Barrancas, Florida.

*Orchelimum fidicinium* Rehn and Hebard.

Oceanview, Virginia; Wrightsville, North Carolina; coast of South Carolina; Savannah, Tybee Island and Cumberland Island, Georgia.

*Orchelimum militare* Rehn and Hebard.

Winter Park and Lake Waccamaw, North Carolina; Florence, South Carolina; Jesup, Waycross, Jordan's on Billy's Island, Homer-ville, Tifton and Bainbridge, Georgia, and Jacksonville, Atlantic Beach and Hastings, Florida.

*Orchelimum bradleyi* Rehn and Hebard.

Wilmington, North Carolina; Chase Prairie in Okefenokee Swamp, Georgia, and Jacksonville and Tallahassee, Florida.

*Orchelimum superbum* Rehn and Hebard.

Tappahannock, Essex County, Virginia, VII, 27 to 28, 1915, (H. Fox, in tidal marsh on *Scirpus americanus*), 4 ♂, [U. S. N. M.; A. N. S. P. and Fox Cn.].

Dr. Fox has kindly permitted us to include this record in the present paper. The species was previously known only from southern New Jersey. Two of the specimens have the outer genicular lobe of the caudal femora bispinose.

#### CONOCEPHALUS Thunberg.

The American material of this genus in the collections before us has also recently been fully treated by the present authors.<sup>121</sup> The

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<sup>121</sup> *Trans. Am. Ent. Soc.*, XLI, pp. 155-224, (1915); *ibid.*, pp. 225-290.

localities represented in the collections here being considered, are as follows:

*Conocephalus allardi* (Caudell).

Wytheville, Virginia, and Rabun County, Georgia.

*Conocephalus fasciatus fasciatus* (De Geer).

Chestertown and Island Creek, Maryland; Washington, D. C.; Fredericksburg, Norfolk, Virginia Beach, Hickory, Appomattox and Wytheville, Virginia; Eure, Selma, Winter Park, Lake Waccamaw, Greensboro, Salisbury, Roan Mountain, Linville, Morganton, Balsam, Governors Island and Tipton, North Carolina; Denmark and Yemassee, South Carolina; Trenton, Marietta, Atlanta, Augusta, Savannah, Tybee Island, Isle of Hope, Jesup, St. Simon's Island, Brunswick, Cumberland Island, Wayeross, Billy's Island, Macon, Westpoint, Columbus, Albany and Bainbridge, Georgia, and Jacksonville, South Jacksonville, Atlantic Beach, Pablo Beach, Live Oak, Tallahassee, Marianna and Cedar Keys, Florida.

In addition we have before us 1 ♀, Daytona, Fla. XI, 11, 1911, (G. P. Englehardt), [Bklyn. Inst. A. & S.].

*Conocephalus brevipennis* (Seudder).

Plummer's Island, Cabin John and Marshall Hall, Maryland; Washington and Anolostan Island, D. C.; Rosslyn, Falls Church, Appomattox, Wytheville, Cape Henry, Norfolk and Virginia Beach, Virginia; Fayetteville, Roan Mountain, Linville, Saluda, Governors Island, Wilmington and Lake Waccamaw, North Carolina; Spartanburg, Florence and Yemassee, South Carolina; Atlanta, Savannah, Sandfly, Billy's Island and Homerville, Georgia, and South Jacksonville and Atlantic Beach, Florida.

*Conocephalus nemoralis* (Seudder).<sup>122</sup>

Sharpsburg and Plummer's Island, Maryland; Washington, D. C., and Luray, Virginia.

*Conocephalus strictus* (Seudder).

Washington, D. C.; Arlington, Falls Church, Norfolk, Virginia Beach and Appomattox, Virginia, and Newbern, North Carolina.

*Conocephalus stictomerus* Rehn and Hebard.

Chestertown, Maryland; Churchland, Virginia, and Raleigh, North Carolina.

<sup>122</sup> A specimen from Bogotá, Colombia, recently recorded as this species by Bruner (*Ann. Carneg. Mus.*, IX, p. 375, (1915)) is certainly not this form or is erroneously labelled.

***Conocephalus aigialus*** Rehn and Hebard.

Cape Henry and Oceanview, Virginia; Wrightsville, North Carolina; Tybee Island, Georgia, and Jacksonville, South Jacksonville and Pablo Beach, Florida.

***Conocephalus nigropleuroides*** (Fox).

Oceanview, Virginia; Wrightsville, North Carolina; Cumberland Island, Georgia, and Cedar Keys, Florida.

***Conocephalus spartinae*** (Fox).

Oceanview and Virginia Beach, Virginia; Wrightsville, North Carolina, and Tybee Island, Georgia.

***Conocephalus saltans*** (Seudder).

Somerset Heights and Cabin John Run, Maryland; Washington, D. C.; Fayetteville, Wilmington, Winter Park, Wrightsville and Lake Waccamaw, North Carolina; Florence and Yemassee, South Carolina; Atlanta, Stone Mountain and Spring Creek in Decatur County, Georgia.

***Odontoxiphidium apterum*** (Morse).*North Carolina.*

Fayetteville, IX, 9, 1911, (H.), 1 ♂.  
Winter Park, IX, 7, 1911, (R. & H.),  
6 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (H.), 2 ♂.  
Ashley Junction, VIII, 15, 1913, (R.),  
8 ♂, 4 ♀, 2 juv. ♀.  
Denmark, VIII, 15, 1903, (A. P. Morse),  
6 ♂, 8 ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
13 ♂, 6 ♀, 1 juv. ♀.

*Georgia.*

Blue Ridge, VII, 25, 1903, (A. P. Morse),  
1 juv. ♀.  
Dalton, VIII, 7, 1913, (R.), 1 ♀.  
Sand Mountain, VIII, 25, 1903,  
(A. P. Morse), 3 ♂, 1 juv. ♀.  
Toccoa, VIII, 5, 1913, (H.), 1 ♀.  
Currahee Mountain, VIII, 5, 1913,  
(H.), 7 ♂, 1 ♀, 3 juv. ♀.  
Stone Mountain, VIII, 3, 1913, (H.),  
1 ♂.  
Vicinity of Stone Mountain, VIII, 3,  
1913, (H.), 1 ♀.  
Warm Springs, VIII, 9-10, 1913, (R.),  
5 ♀, 1 juv. ♂, 2 juv. ♀.  
Macon, VII, 30-31, 1913, (R. & H.),  
9 ♂, 4 ♀, 1 juv. ♂, 3 juv. ♀.  
Tifton, IX, 8, 1910, (J. C. Bradley),  
4 ♂.  
Albany, VIII, 1, 1913, (R. & H.), 10 ♂,  
6 ♀, 6 juv. ♀.

Bainbridge, IX, 3-7, 1910, (J. C. Bradley), 1 ♂.  
Spring Creek, VII-VIII, 1912-13,  
(J. C. Bradley), 3 ♂, 1 juv. ♀.  
Augusta, VII, 29, 1913, (R. & H.),  
2 ♂, 1 ♀, 4 juv. ♀.  
Savannah, VIII, 14, 1903, (A. P. Morse),  
5 ♂.  
Sandfly, IX, 3, 1911, (R. & H.), 10 ♂,  
5 ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
21 ♂, 16 ♀.  
Groveland, VII, 28, 1913, (J. C. Bradley), 1 ♂.  
Jesup, IX, 1, 1911, (R. & H.), 7 ♂,  
2 ♀.  
Brunswick, VIII, 30, 1911, (H.), 10 ♂,  
4 ♀.  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 1 ♀.  
Cumberland Island, VIII, 31, 1911,  
(R. & H.), 3 ♂, 3 ♀.  
Waycross, VIII, 11, 1903, (A. P. Morse),  
2 ♂, 2 juv. ♀.  
Hebardville, V, 15, 1915, (H.), 1 juv. ♂.  
Suwannee Creek, VIII, 28, 1911, (R. & H.), 3 ♂, 4 ♀.  
Billy's Island, V, 16, 1915, (H.),  
1 juv. ♀; VI, VII, IX, 1912, (J. C. Bradley), 15 ♂, 3 ♀.  
Honey Island, VI, 1, 1912, (J. C. Bradley), 1 adult.  
Homerville, VIII, 27, 1911, (R. & H.),  
4 ♂, 6 ♀, 2 juv. ♀.

*Florida.*

Jacksonville, VIII, 25, 1911, (R. & H.),  
 11 ♂, 20 ♀, 5 ♀ n.; XI, 3, 1911,  
 (W. T. Davis), 2 ♂, 1 ♀.  
 South Jacksonville, IX, 7, 28, 1911,  
 (W. T. Davis), 5 ♂, 4 ♀.

Atlantic Beach, VIII, 24-25, 1911,  
 (R. & H.), 10 ♂, 9 ♀.  
 Pablo Beach, IX, 5, 1913, (W. T.  
 Davis), 1 ♂, 1 ♀.  
 Live Oak, VIII, 10, 1903, (A. P. Morse),  
 5 ♂, 6 ♀; VIII, 26, 1911, (R. & H.),  
 12 ♂, 7 ♀, 1 juv. ♀.

The material from the region about Jacksonville averages the largest of any recorded above; there appears, however, to be little size variation correlated with northern and southern distribution in the present large series, and the specimens taken at Jacksonville in November are as small as any examples we have seen. These latter specimens, when compared with the largest from that locality, give the following extremes of measurement: length of body, ♂ 9.9-14.3, ♀ 12-16.3; length of ovipositor, 11.2-15.4 mm.

The stridulation of this curious species is a very faint and intermittent zip-zip-zee-zee-zee zip-zee-zee, etc. The males when stridulating often climb high up in the undergrowth; we have frequently found them three or four feet from the ground.

Throughout the low country of the Carolinas, Georgia and Florida, this is one of the most ubiquitous species in the undergrowth of the pine woods and also on palmetto flats. At a number of localities the insects were found particularly numerous about oak shoots in such situations. In the high country of Georgia the species was found scarce in level woods (Dalton), everywhere abundant in luxuriant mountain vegetation of grasses, vines and oak sprouts under a forest predominantly black-jack oak (Currahee Mountain), in a patch of mint in a bunch-grass area under pines (on Stone Mountain) and among oak shoots in undergrowth of mixed forest (Toccoa, vicinity of Stone Mountain, Warm Springs).

**ATLANTICUS** Seudder.

The species of this genus have recently been studied by the authors.<sup>123</sup> A full treatment of the material from the region under consideration is there presented. We here give the localities of the material before us belonging to the eight species found in the area at present treated.

**Atlanticus testaceus** (Seudder).

*A. pachymerus* of most authors.

Plummer's Island, Cabin John Run and Glen Echo, Maryland; Washington, D. C.; Arlington, Virginia.

<sup>123</sup> *Trans. Am. Ent. Soc.*, XLII, pp. 33-100, (1916).



**Atlanticus pachymerus** (Burmeister).

Greensboro, Raleigh, Goldsboro, Lake Ellis (Havelock) and Southern Pines, North Carolina.

**Atlanticus davisii** Rehn and Hebard.

Meadow Mountain at 3,000 feet elevation, Conowingo, Laurel, Beltsville and Glendale, Maryland; Rock Creek, D. C.; Arlington, Fairfax County, Great Falls, Falls Church, Green Dell Farm two miles west of Pohick in Fairfax County, Orkney Springs, Stony Man Mountain, Orange, Hot Springs and Addison, Virginia.

**Atlanticus monticola** Davis.

Washington County, Virginia; Linville, Black Mountains, Valley of Black Mountains, Jones' Knob, Balsam Mountains and Lake Toxaway, North Carolina; Pinnacle Peak and Clayton, Georgia.

**Atlanticus americanus** (Saussure).

*A. dorsalis* of most authors.

Cabin John Run and Plummer's Island, Maryland; Washington, D. C.; Arlington, Clarendon, Falls Church, Seven Mile Ford, Orange and Roanoke, Virginia; Greensboro, Sulphur Springs, Waynesville, Lake Toxaway, Topton, Andrews and Murphy, North Carolina; Clayton, Tuckoluge Creek, Rabun Bald, top of Pinnacle Peak, Tallulah Falls, Sand Mountain, Jasper and Lost Mountain, Georgia.

**Atlanticus gibbosus** Seudder.

Florence and Magnolia, South Carolina; Currahee Mountain, Warm Springs, Sandfly, Billy's Island and Spring Creek, Georgia; Crestview, Lake City, Jacksonville, Atlantic Beach, Pablo Beach and Hastings, Florida.

**Atlanticus dorsalis** (Burmeister).

Billy's Island and Thomasville, Georgia; Jacksonville, Florida.

**Atlanticus calcaratus** Rehn and Hebard.

Billy's Island, Georgia, and Hastings, Florida.

**Camptonotus carolinensis** (Gerstaecker).*Delaware.*

Dover, (Miss Lillian Hall), 1 ♀,  
[A. N. S. P.].

*Virginia.*

Near Washington, D. C., X, 13, 1883,  
1 ♀, [Hebard Cln.].  
Orange, VII, 21, 1913, (R. & H.;  
beaten from low herbage), 4 juv. ♂.

*North Carolina.*

Charlotte, VII, 27, 1913, (R. & H.;

beaten from wild grape vines on  
ground in short-leaf pine woods),  
1 juv. ♂.

*Georgia.*

Thompson's Mills, X, 1909, (H. A.  
Allard), 1 ♂, [Hebard Cln.].  
Spring Creek, VI, 7-23, 1911, (J. C.  
Bradley), 1 juv. ♀.

*Florida.*

St. Augustine, (C. W. Johnson), 1 ♂,  
[A. N. S. P.].

Two consecutive instars are represented in the four immature males from Orange, both earlier than that exemplified by the Charlotte specimen, which is in the instar preceding maturity. The records from Spring Creek and St. Augustine are the most southern known for the species in the Atlantic coast States.

**Hadenæus puteanus** Scudder.

*North Carolina.*

Sunburst, late May, 1912. (C. S. Brimley), 2 juv. ♀, [Brimley Cln.].

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 2 juv. ♂, 2 juv. ♀.

Thompson's Mills, X, 1909, (H. A. Allard), 2 ♂, 6 ♀, 3 juv., [U. S. N. M. and Hebard Cln.].

Billy's Island, IX, 1-5, 1913, (J. C. Bradley), 2 ♂, [Cornell Univ.].

The immature females show that the dentations of the internal valves of the ovipositor are not appreciably indicated until the adult condition is reached. We have had before us for comparison a cotype from North Carolina, received from Scudder by Bruner, in whose series it was.

The above Georgia localities in a measure connect up the two previously known records of the species from the southern States, *i.e.*, North Carolina and Monticello, Mississippi.

**Ceuthophilus uhleri** Scudder.

*Maryland.*

Cabin John Run, IX, 1911, (W. T. Davis; trapped in molasses jar), 14 ♂, 34 ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 3 ♂, 3 ♀.

Clayton, VIII, 18, 1 juv. ♀, [Ga. State Cln.].

Pinnacle Peak, VIII, 20, 1913, (J. C. Bradley), 1 juv. ♂.

We have examined authentic material of this species and of *C. blatchleyi* Scudder and, apparently, the supposed differential features are too variable for reliance. However, we do not care to synonymize the latter name, as our material is not sufficiently conclusive to warrant such action at this time.

This species varies greatly in size in both sexes, the extremes (in millimeters) of undoubtedly adult material of both sexes from Cabin John Run being:

	♂	♂	♀	♀
Length of pronotum . . . . .	4.8	6	5	5.3
Length of cephalic femur . . . . .	6.5	8	6.5	7
Length of caudal femur . . . . .	14.3	18	14	14.5
Length of caudal tibia . . . . .	15.3	19.9	15.6	16.2
Length of ovipositor . . . . .			8.9	9.9

The surface of the body is never polished in the male, always being dull and at times almost velvety in appearance. In the female sex this condition is present, but not as a rule, the majority of the individuals of that sex having the surface weakly polished. The males show a very appreciable amount of individual variation in the lamellate development of the ventro-external margin of the caudal femora, as well as in the number, disposition and size of the spines on the same margin.

The species is known to range from the vicinity of the city of New York to northeastern Georgia; in addition to these given above, the only definite record of its occurrence in the southeastern States is that from Raleigh, North Carolina (Brimley).

**Ceuthophilus latibuli** Scudder.

1905. *Ceuthophilus virgatipes* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 798. [Thomasville, Georgia.]

Bainbridge, Georgia, VII, 15-27, 1909, (J. C. Bradley), 1 ♂.

Clearwater, Florida, VI, 27, 1 juv. ♀, [Cornell Univ.].

Jupiter, Fla., V, 2, 1903, (D. M. Castle), 1 ♂, 10 juv. ♂, 1 juv. ♀, [A. N. S. P.].

The species *virgatipes*, when described, was compared with *secretus* and *varicator*, with which it has, however, no relationship. This erroneous comparison was due to Scudder's key, which ran adults to the vicinity of the above-mentioned species, while *latibuli* was placed by him in another section, in which authentic material examined by him at that time, and now before us, would not fall. The type (male) of *virgatipes* is in the instar preceding maturity, but the allotype (female) is fully adult. It is evident that the full development of the caudal spurs and calcaria is not acquired until the adult condition is reached, these being relatively shorter in the nearly adult specimens than in the mature individuals. There is also some individual variation in the length and development of the spurs and in the length of the different calcaria. The more subdued general coloration of the *virgatipes* material is in part due to discoloration. The color pattern is seen to vary greatly in intensity and consequently in the relative extent of the pale and dark areas.

The species has been reported from "gopher" holes at Crescent City and Enterprise, Florida, and from "Georgia," in addition to the localities mentioned above.

**Ceuthophilus gracilipes** (Haldeman).

1894. *Ceuthophilus grandis* Scudder, Proc. Amer. Acad. Arts and Sci., XXX, pp. 24, 38. [Chattanooga, Tennessee.]

1894. *Ceuthophilus heros* Scudder, *ibid.*, pp. 26, 54. [North Carolina.]

*Maryland.*

Garrett County, last week of July,  
(W. Stone), 2 ♀, [A. N. S. P.].  
Cabin John Run, IX, 1911, (W. T.  
Davis; trapped in molasses jar),  
7 ♂, 9 ♀, 3 juv. ♂.  
District of Columbia, VI, 1910, (W. T.  
Davis; trapped in molasses jar),  
1 juv. ♂, 1 juv. ♀.

*Virginia.*

Alexandria County, VI, 1910, (W. T.

Davis; trapped in molasses jar),  
11 juv. ♂, 6 juv. ♀.

*North Carolina.*

Black Mountain, IX, 6, 1 ♂, [B. I.].

*Georgia.*

Rabun County, VII, 1910, (W. T.  
Davis), 2 ♂, 4 juv. ♀.  
Wilson Gap, Rabun County, VIII,  
22, 1913, (J. C. Bradley), 3 ♂, 7 ♀.  
Clayton, 2,000-3,000 feet, VI, 1909,  
(W. T. Davis), 1 juv. ♀.

We have carefully studied the original descriptions of the two species here synonymized, and we are unable to separate them from typical *gracilipes* by the presence of any invariable character or characters. We have also had before us a paratype of *heros*, labelled as such in Scudder's handwriting.

The species *gracilipes* is a very variable one in certain features, *i.e.*, size, relative elongation and depth of the caudal femora and spination of the same, character of the caudal tibiae and coloration. The size variation, as seems to be the rule in the genus, is very considerable, the extremes (in millimeters) of adults of both sexes from Cabin John Run being:

	♂	♂	♀	♀
Length of pronotum .....	5.1	6.7	6.2	7.2
Length of cephalic femur.....	8.6	11.9	10	11.1
Length of caudal femur.....	17.9	24.2	19.8	22.8
Greatest depth of caudal femur.....	4.4	6.4	5	5.6
Length of caudal tibia .....	20.6	26.4	22.2	25.2
Length of ovipositor.....			10.2	14.2

The caudal femora seem to show some geographic correlation in the variation of comparative depth to length, specimens from northern Georgia showing the greatest relative depth, while more northern individuals generally have the caudal femora distinctly more slender, but this is by no means a rule, as northern specimens frequently have as robust femora as more southern material. The male paratype of *heros* from North Carolina has the caudal femora relatively quite slender. The spination of the ventro-external margin of the caudal femora of the male is extremely variable in character, ranging from the relatively heavier, basally tumid, spines of typical *grandis* to the weak and relative short type found in the paratype of *heros*. Between these extremes we find all intermediates in the strength of the spines, while the number of the same varies from as few as eight to as many as sixteen.

The caudal tibiae are generally somewhat valgate proximad, but

are frequently straight. The exact thickness (*i.e.*, section) of the tibia varies somewhat, in one male from Blocton, Alabama (reported by Scudder and determined by him as *gracilipes*, the locality, however, being erroneously given as "Blocton, Florida"), being greater than in any other individual seen. The depth of the general body coloration varies appreciably, but there is generally an approximate uniformity in material from the same locality. As a rule, northern adult material shows a more transverse disposition of the color pattern and southern material a more longitudinal one. The two tendencies are to be seen in many forms of this genus, sometimes both the longitudinal and transverse being developed in the same individual, in others one at the expense of the other and again a general suffusion tones all to a deeper uniformity. The scalariform pattern of the caudal femora is weaker in northern than in southern specimens, as is also generally the case with the infuscation of the distal femoral portions and the presence of the pale pregenicular annulus on the caudal femora. These two latter features are rarely indicated in northern adults, but distinct in all the southern specimens.

Immature specimens from all localities, however, have a decidedly contrasted color pattern, made up of longitudinal and transverse elements, much as in the southern States adults, with darkened femoral apices and distinct pale pregenicular annuli on the caudal femora.

***Ceuthophilus lapidicola* (Burmeister).**

*North Carolina.*

Grandfather Mountain, above 4,000 feet, VII, 21, 1904, (G. M. Bentley), 1 juv. ♂, [N. C. State. Dept. Agr.].  
Black Mountain, 1 ♀, [B. I.].

Sunburst, Haywood County, late May, 1912, (C. S. Brimley), 1 juv. ♂, 1 juv. ♀, [Brimley Chn.].  
Andrews, VIII, 19, 1904, (F. Sherman Jr.), 1 ♀, [N. C. State Dept. Agr.].

We have also a pair of specimens labelled "North Carolina, (Morrison)," determined and recorded as this species by Scudder. At the present time it is not possible to determine the correctness of Scudder's assignment of Burmeister's name to this species, the description of which is quite inadequate to place positively the name, but it seems quite probable that his action was correct. In addition to this North Carolina material, we have before us quite a few specimens from the northeastern States. Through the kindness of Dr. E. M. Walker, we have been able to examine four male and three female paratypes of that author's *C. pallidipes*, described from five localities in Ontario.<sup>124</sup> This is the northern extreme of the

<sup>124</sup> *Can. Ent.*, XXXVII, p. 115, pl. IV, figs. 2-2c, (1905).



species for which we use the name *lapidicola*; the specimens are much reduced in size, but inseparable from individuals from more southern localities. The description of *pallidipes*, in its analysis of the differential characters, is a decided aid to an understanding of the species.

The specimens recorded by Sherman and Brimley,<sup>125</sup> from Andrews and Grandfather Mountain, North Carolina, as *C. tenebrarum*, belong to this species, as an examination of the material shows. From Andrews there is a small adult female, from Grandfather Mountain a nearly adult quite small male minus the caudal limbs. The Southern Pines record was based on a minute immature specimen which we would not care to determine. At this writing we cannot make any statement on the status of Scudder's *tenebrarum*. The Sunburst pair recorded above is not quite mature, but clearly represents the present species.

The species was described from Virginia and South Carolina, but previously we have had no exact record from the southeastern States.

***Ceuthophilus latens* Scudder.**

Alexandria County, Virginia, VI, 1910 and 1914, (W. T. Davis; trapped in molasses jar), 36 ♂, 24 ♀, 2 juv. ♀, [Davis Cln.].

We are using for comparison certain specimens from Ithaca, New York, in the collection of Cornell University, and a female from Vigo County, Indiana, in the Hebard Collection, which were determined as this species by Scudder. The series here recorded is of considerable interest, as it shows to what extent individual variation is present in this striking and beautiful species.

In size the usual amount of variation is present, the extremes (in millimeters) being:

	♂	♂	♀	♀
Length of pronotum.....	4.8	5.5	5	5.9
Length of cephalic femur.....	5.8	6.8	5.4	6
Length of caudal femur.....	12.9	14.7	12.1	14.9
Length of caudal tibia.....	13.4	15.9	12.9	15.3
Length of ovipositor.....		.....	8.1	9.2

The color pattern of this species is probably more uniformly constant than in any other species of the genus of which we have seen a considerable series. The broad pale dorsal line and the broad bordering dark lines are always indicated on the thoracic segments and their variation in width is relatively small, while the abdominal markings and the clouding of the caudal femora are characteristic of this species and *lapidicola*, and vary only in depth.

<sup>125</sup> *Ent. News*, XXII, p. 311, (1911).

The pale base color is more orange-ochraceous in some individuals than in others, the extremes being pale clay color and burnt sienna.

This species and *lapidicola* are very closely related, the females particularly being extremely hard to separate. Of the few differences shared by both sexes may be mentioned the narrower medio-longitudinal pale bar in *lapidicola*, which also has a greater irregularity of its margins, and a frequent breaking up of the dark lateral bars. The males of the two species can, in addition, be separated by the more robust caudal femora in the present species and the form of the supra-anal plate, which has the distal margin submembranous in *latens* and chitinous in *lapidicola*, the plate also more elevated distodorsad in *lapidicola* than in *latens*.

The immature specimens of *latens* listed above have the thoracic pattern essentially as in the adults.

***Ceuthophilus sallei* Scudder.**

De Funiak Springs,<sup>126</sup> Florida, 1 ♂, 1 ♀, 1 juv. ♀, [Cornell Univ.].

We have compared these specimens with a paratype from New Orleans and find no important or constant differences. The color pattern is seen to vary in intensity to such a degree that occasionally (in the adult female) the thoracic pattern is obsolete, although the abdominal section is weakly indicated and the femoral pattern typical, but not very decided.

The authors' *C. peninsularis*,<sup>127</sup> from southern Florida, is a close relative of this species, but just how close cannot be determined until the female sex of the more recent form is known.

The distribution of the species is here extended somewhat to the eastward of the type and only previously known locality—New Orleans.

***Ceuthophilus spinosus* Scudder.**

Cabin John Run, Maryland, IX, 1911, (W. T. Davis; trapped in molasses jar), 1 ♀, [Davis Cln.].  
Washington, D. C., IV, 20, 1 ♀, [Hebard Cln. ex Bruner.],<sup>128</sup>  
District of Columbia, VI, 1910, (W. T. Davis; trapped in molasses jar), 3 ♂, 2 ♀, [Davis Cln.].

Arlington, Virginia, VII, 9, 1914, (H.; taken at night with light), 1 ♀.  
Raleigh, North Carolina, II, 9, 1904, (Brinley; under log in pine woods), 1 ♀, [Hebard Cln.].  
Atlanta, Georgia, VIII, 18, 1912, 3 ♀, [Ga. State Cln.].

<sup>126</sup> These specimens are merely labelled "Funiak, Fla." but as there seems to be no locality of that name, we feel little doubt of their reference to the well-known locality given above.

<sup>127</sup> PROC. ACAD. NAT. SCI. PHILA., 1914, p. 408, (1914).

<sup>128</sup> In Scudder's original series of *C. neglectus*, a specimen from Washington, D. C., in the Bruner Collection, is listed. This record refers to the above specimen, which can be separated from the other paratype females of *neglectus* from the Bruner Collection, by the more slender caudal femora and the fewer (four instead of five) teeth on the internal valves of the ovipositor.

We have no authentic material of this striking species and our determination rests on the agreement of our very extensive series with the original description. We have, in addition to the specimens here listed, larger series from the northeastern States, which we will treat in detail at a later date.

This species appears to be typical of a distinctive group of the genus, characterized in the male sex by the broad linguiform produced supra-anal plate. The form of the subgenital plate, which bears a cordiform callose pattern, is quite peculiar, while the general type of the caudal femora is different from that of any species of the genus found in the eastern States with which we are acquainted. There is a slight development of the fastigial ridge, less decided, however, than in the *uhleri* group. The internal valves of the ovipositor bear but four teeth, which are strongly developed, instead of the more usual five or six teeth. The distal extremity of the external ovipositor valves is obliquely truncate, with the spiniform dorso-distal point very well developed and directed at an angle of about fifty degrees to the longitudinal axis of the ovipositor.

There is a great amount of individual variation in size and robustness of the whole body, and in the male this variational feature of the caudal femora is very pronounced, and rather disproportionately so. The number of teeth on the ventro-external margin of the caudal femora and the character of the same are quite variable in the male sex. At a later date we intend to give additional information on these points from the other material we now have.

In the southern States the species appears to be one of the Piedmont region, the lowest elevation from which we have definite records being Raleigh and Southern Pines (Sherman and Brimley), North Carolina, and Atlanta, Georgia.

***Ceuthophilus neglectus* Seudder.**

Cabin John Run, Maryland, IX, 1911,  
(W. T. Davis; trapped in molasses  
jar), 34 ♂, 38 ♀, [Davis Cln.].  
District of Columbia, VI, 1910. (W. T.  
Davis; trapped in molasses jar),  
22 ♂, 33 ♀, [Davis Cln.].

Alexandria County, Virginia, VI, 1910.  
(W. T. Davis; trapped in molasses  
jar), 51 ♂, 73 ♀, 9 juv. ♂, [Davis  
Cln.].  
Orange, Va., VII, 21, 1913, (R. & H.),  
3 juv. ♂.

We have before us three male and three female paratypes of *neglectus*, one of the females of which, as we have already shown, belongs to *spinusus*. We have also male and female paratypes of *terrestris*, these being the pair recorded by Seudder from Chateaugay Lake, Adirondack Mountains, New York. As stated by Walker,<sup>129</sup>

<sup>129</sup> *Can. Ent.*, XXXVII, p. 118, (1905).

certain of the specimens considered to be *terrestris* by Scudder, in his description of the latter, are really *neglectus*. This is true of the two specimens from Chataugay Lake, which, while quite small, are distinctly *neglectus*. Just how much of the original series of *terrestris* belongs to *neglectus* we cannot say at the present writing, but, as Walker has shown, the few adult males in the Scudder Collection represent the latter species.

As Walker has said in explanation of his figure of the subgenital plate of the male of this species,<sup>130</sup> the type there shown is that of the immature male. This portion of the adult male is different, having no distal projections and with the free margin arcuato-truncate or weakly emarginate, the plate entire or undivided, a median fold or sulcus frequently present distad, but this is not a true division of the plate. The supra-anal plate of the adult is elongate, trigonal-linguiform, taken with the shape of the adjacent dorsal abdominal segments and the subgenital plate being characteristic of the species.

The ovipositor of the female bears five, or more rarely six, teeth on the internal valves.<sup>131</sup> The individual size variation in adults of the species is very great, so much so that the extremes might not be recognized as the same species, as the larger specimens, by their bulkiness, have a different general appearance. In the Alexandria County series the extremes in size (in millimeters) are as follows:

	♂	♂	♀	♀
Length of pronotum .....	4.8	6	4.9	6
Length of cephalic femur.....	5.6	6.9	5	5.6
Length of caudal femur.....	12.5	16	10.4	13.6
Length of caudal tibia.....	12.8	15.5	10.8	13.4
Length of ovipositor.....			5.9	7.4

The coloration is quite variable in the depth of the pattern, which in the paler specimens has a decided medio-longitudinal pale line on the thoracic segments, and a closely tessellate abdomen, which in the darker individuals has the median line subobsolete and the tessellations reduced in number, although but little in intensity. The caudal femoral scalariform pattern, which is generally moderately indicated, frequently strongly marked, is relatively poor in contrast in the darker individuals.

<sup>130</sup> *Can. Ent.*, XXXVII, p. 117, pl. V, figs. 3b-3c, (1905).

<sup>131</sup> In very rare instances, only two females from Alexandria County, Virginia, out of one hundred and seventy-five examined for this character, we find but four teeth present on these valves, but in these individuals the usual two distal teeth are fused and the form of the caudal femora and margins of the same correctly associate the specimens.

The species appears to be one of the more abundant, if not the most abundant, of the genus found in the eastern United States. In the southeastern States it has, as far as known, a very limited distribution, not having been taken south of Orange, Virginia.

### GRYLLIDÆ.

#### *Gryllotalpa hexadactyla* Perty.

1838. *Gr[yllotalpa] borealis* Burmeister, Handb. Entom., II, Abth. II, pt. 1, p. 740. [North America.]

##### Maryland.

Bohemia Bridge, Cecil County, V, 30,  
1914, (H. W. Fowler), 3 ♀, [A. N.  
S. P.], brachypterous.

##### District of Columbia.

Washington, IV, 20, 1 ♀, [Hebard  
Cln.], brachypterous.

##### Georgia.

Rabun County, VII, 1910, (W. T.  
Davis), 3 juv.<sup>132</sup>  
Lavender, 1 ♂, [Ga. State Cln.],  
brachypterous.

Marietta, VII, 27, 1903, (A. P. Morse),  
1 ♀.

Atlanta, VI, 26 to VIII, 28, 1909 to  
1912, 3 ♀, 1 juv., [Ga. State Cln.],  
2 brachypterous.

Billy's Island, Okefenokee Swamp,  
VI, 1912, (J. C. Bradley), 1 ♀,  
brachypterous.

##### Florida.

Enterprise, IV, 17, (P. Laurent), 1 ♂,  
[Hebard Cln.], brachypterous.

Lake City, 1 ♀, [Hebard Cln.], bra-  
chypterous.

After careful examination of material from many localities in America, extending from the United States southward to the southern borders of tropical South America, we find that there is no valid ground for separating Burmeister's *borealis* from *hexadactyla* of Perty, described in 1832 from Minas Geraes, Brazil.<sup>133</sup> Few comparisons are to be found between these supposedly distinct forms, Sausure and Scudder giving as differences the somewhat smaller size of *hexadactyla* and the more rounded projection at the base of the second lateral dactyl of the cephalic tibiae. The series before us show that the insect attains its greatest size development in the United States, but that little constancy exists is also demonstrated, as specimens from the same locality in several cases show almost the maximum difference in size found in the entire series before us, which numbers considerably over one hundred specimens. The rounded chitinous projection at the base of the second lateral dactyl of the cephalic tibiae is normally rounded, but is often worn down to a more or less angulate condition and is naturally valueless as a character in this respect. No other differences exist between North and South American examples, and *borealis* as a result falls into the above

<sup>132</sup> Two of these individuals are in the very early stages and the smallest of these has three, instead of four, tibial dactyls. In three other specimens in the same instar before us, this remarkable feature is also found.

<sup>133</sup> *Delect. Anim. Art. Brasil.*, p. 119, pl. 23, fig. 9, (1830-34).



synonymy. Previously the following names have been found to be synonyms of *borealis*: *americana* Harris, 1835; *brevipennis* Serville, 1839; *longipennis* Scudder, 1862, and *columbia* Scudder, 1869.

In the present species some variation is shown in the shape of the ocelli and in the tegminal venation.

Material from Florida and southern Georgia averages somewhat smaller than material from more northern points; the smallest adult specimen of the species we have ever seen is that from Billy's Island, Georgia, the measurements of which are: length of body 20.4, of pronotum 7.2, of tegmen 6.4, of caudal femur 6, and greatest width of pronotum 5.7 mm.

Females of the species have been taken much more frequently than males and the brachypterous condition is more frequently found in both sexes in the region at present under consideration.

**Scapteriscus vicinus** Scudder. Pl. XIV, figs. 4, 5, 6, 7.

1869. *Scapteriscus agassizii* Scudder, Mem. Peabody Acad. Sci., I, p. 13. [Switzerland (introduced from Central America?).]

*Georgia.*

Waycross, X, 20, 1914, (W. Tatum, Jr.), 1 juv., [U. S. N. M.].  
 Hebardville, V, 15, 1915, (H.; in sandy soil in garden, associated with *S. aetetus*, but very scarce), 2 ♂, 2 ♀.  
 St. Simon's Island, IV, 22 to IX, 8, 1909 to 1911, (J. C. Bradley), 3 ♂, 4 ♀, 4 juv.; (W. V. Reed), 9 ♂, 3 ♀, 1 juv., [Hebard Cln.].  
 St. Simon's, St. Simon's Island, III, 18, 1912, (W. V. Reed), 6 ♀, [U. S. N. M.].

Brunswick, II, 5, 1903, (S. W. Goodyear), 3 ♂, 1 ♀, 1 juv., [U. S. N. M. and Hebard Cln.]; IV, 18, 1912, (W. V. Reed), 1 ♂, 4 ♀, [U. S. N. M.]; XI, 1907, 1 ♂, [Ga. State Cln.].  
 Cumberland Island, VIII, 31, 1911, (H.; under log on strand), 1 juv.  
 White Oak, IX, 1904, (A. S. Barnwell), 1 ♂, [U. S. N. M.].

After careful consideration of very large series, representing every species of the present genus, we are satisfied that the species found abundantly in the southeastern United States, the West Indies and portions of South America, and which has been frequently recorded as *S. didactylus*, represents instead *vicinus* of Scudder. This species is very closely related to *didactylus* of Latreille (described from Surinam and found elsewhere in South America and northward to Costa Rica), but is somewhat heavier, with the width of the pronotum distinctly greater in proportion to its length and with the basal width between the tibial daetyls averaging somewhat less. The species is, however, not nearly as distinct as Scudder believed, for the characters of the but little dissimilar ocelli, slightly different terminal tarsal joints of the caudal tibiae and other differences which he gives in the original description are practically valueless.

The species, *agassizii*, described by that author on the following



page of the same work, is a synonym of *vicinus*, based on minor differences in these characters, which in each of the many series before us show some such slight differentiation.

This species is a serious pest in portions of the State of Georgia; at Darien, in 1906, the insects destroyed a great portion of the grass on the golf course.<sup>134</sup>

**Scapteriscus acletus**<sup>135</sup> new species. Pl. XIV, figs. 8, 9, 10, 11.

Closely related to *S. mexicanus*,<sup>136</sup> differing<sup>137</sup> in the shorter dactyls and spines of the limbs, normally fewer spines of the dorso-internal margins of the caudal tibiae,<sup>138</sup> shorter limbs and much less compressed terminal tarsal joints of the caudal tibiae (in this species no wider than the caudal metatarsus, in *mexicanus* distinctly wider with dorsal portion decidedly compressed). The present species and *mexicanus* agree, however, in the wide separation of the tibial dactyls, the elongate pronotum and decidedly elongate lateral ocelli, which characters readily distinguish them from *S. vicinus*, from which species the present insect also differs greatly in color pattern of the pronotum, general coloration in life and narrower terminal tarsal joint of caudal tibiae.

Considering *S. abbreviatus*, the remaining species of the genus found within the boundaries of the United States, we find it to be readily distinguishable from *vicinus*, *acletus* and *mexicanus* by the distinctive coloration (which gives the insect a strongly mottled appearance), small round lateral ocelli and extremely reduced tegmina and wings. The elongate and widely separated tibial dactyls, and spatula with distal portion of ventral margin briefly chitinous and with disto-ventral angle nearly rectangulate and sharply rounded in *abbreviatus*, serve further to indicate that in linear arrangement *vicinus* comes first, followed by *didactylus*, *acletus*, *mexicanus* and *abbreviatus*.

<sup>134</sup> Noted by Hebard, *Ent. News*, XX, p. 179, (1909).

<sup>135</sup> From *α* = not, and *εὐχρητός* = welcome; in allusion to the destructive habits of this insect.

<sup>136</sup> Described by Burmeister, *Handb. Entom.*, II, Abth. II, pt. 1, p. 740, (1838). [Alvarado, Mexico.]

<sup>137</sup> These comparisons are made with an apparently typical female of *mexicanus* (pl. XIV, figs. 12, 13, 14 and 15) from Durango, Mexico, in the Hebard Collection, the measurements (in millimeters) of which are: length of body, 36, of pronotum 11.4, of tegmen 19.2, of wing 26.6, of longest tibial dactyl 5.1, of caudal femur 12.5, of terminal tarsal joint of caudal tibia 3.4; width of pronotum 8.3, of terminal tarsal joint of caudal tibia 1.6. Two other similar females are before us bearing only the data "Mexico."

<sup>138</sup> In *mexicanus* these spines are described as 5-5 in number, and this is true for the specimens of that species before us.

TYPE: ♂; Hebardville, Ware County, Georgia. May 15, 1915. (M. Hebard; in garden.) [Hebard Collection, Type No. 406.]

*Description of Type*.—Size medium, form rather slender. Head with lateral ocelli over twice as long as broad, in direction convergent meso-distad, separated at nearest point by a space twice the length of one ocellus. Eyes somewhat more elongate than in *vicinus*. Tegmina similar to *vicinus*, but with veins not as heavy and cross-veinlets fewer. Wings reaching slightly beyond apex of abdomen. Limb proportions much as in *vicinus*. Dactyls of cephalic tibiae separated by a space equal to basal width of one of these dactyls. Spatula with distal half of ventral margin chitinous, straight, the disto-ventral angle nearly rectangulate and sharply rounded. Median tibiae armed interno-distad with four heavy spurs. Caudal tibiae with ventro-internal margins each bearing four long spines, the last situated very slightly proximad of the three long distal spurs, disto-external margin armed with three short spurs, the dorsal widely separated from the other two. Distal joint of caudal tarsus slender, no wider than metatarsus, with dorsal margin not noticeably compressed. Coloration distinctive.

*Allotype*: ♀; Same data as type. [Hebard Collection.]

*Description of Allotype*.—Similar to type in characters common to both sexes. Tegmina similar to *vicinus*, but, as in male, with veins not as heavy and cross-veinlets fewer. Wings reaching slightly beyond apex of abdomen.

In addition to the type and allotype, we have before us a series bearing the same data and material taken at the same locality from May 15 to 31, 1915, by William Walker; these specimens, 26 ♂, 25 ♀, may be considered paratypes.

This paratype series shows that the species exhibits considerable size variation, the average of the majority of specimens, however, approximates the types in this respect. Both intensive and recessive color patterns are developed, and the tegminal veins and veinlets are sometimes heavier than in the typical condition. Decided uniformity is found in the shape of the lateral ocelli, length and separation of the tibial dactyls and form of distal joint of caudal tarsus. In eighty uninjured specimens the number of spines of the dorso-internal margins of the caudal tibiae are as follows:

Number of spines.....	3-4	4-4	4-5	5-5
Number of specimens.....	1	66	8	5

In one specimen having 5-5 spines, one of these spines is bifurcate.

Slight differences in ocellar form, occasional appearance of an accessory spine on one or both of the dorso-internal margins of the caudal tibiae and slight differences in the separation of the tibial daetyls and in the width of the distal joint of the caudal tarsus, cannot be used as features to separate species of this genus, as discussed above in the treatment of *vicinus*.

*Measurements (in millimeters).*

	♂		♀	
	TYPE.	Paratypes.	Allotype.	Paratypes.
Length of body.....	28.7	26.4-34.4	29.7	26.5-35.5
Length of pronotum.....	9.3	8.8-11.3	9.3	8.5-10.3
Width of pronotum <sup>139</sup> .....	7.3	6.4- 8.9	7.1	6.6- 8.3
Length of tegmen.....	14.7	14.6-17.8	15.2	15-19.2
Length of wing.....	19.6	19.6-24.3	21.7	20.5-26.1
Longest tibial daetyl .....	3.6	3.3- 4	3.1 <sup>140</sup>	3.1- 4.1
Length of caudal femur .....	10.3	10-11.7	10.6	10.2-12
Length of terminal tarsal joint of caudal tibia.....	2.6	2.3- 2.7	2.7	2.6- 2.8
Width of same.....	.8	.7- 1	.8	.8-.9

*Coloration*.—Normal condition (*type*, *allotype*). General coloration pinkish buff. Head with occiput including raised portion of inter-ocular space blackish brown, a brief space of the same color back of the eyes, but separated from them by a narrow interval of the pale general coloration. Pronotum with dorsum marked with an oval of blackish brown, this interrupted cephalad and mesad by rounded incursions from each side of the general pinkish buff coloration, these cephalic indentations weakly connected, the margins of the dark area concave in their caudal fifth. Tegmina and wings buffy with veins darker. Caudal femora of general coloration, but with all except the proximal fourth of dorso-external portion suffused with a darker shade. Abdomen dark above, pale below (in life shining grayish below, contrasting strongly with *vicinus*, which in life has this portion of the body shining cinnamon buff).

An intensive coloration is found in numerous specimens in which the darker markings are all deeper and more extensive, the whole dorsal surface of the pronotum being blackish brown, with the exception of four small pale spots in apposition to the rounded incursions of paler coloration as found in the normal condition.

<sup>139</sup> Owing to the impossibility of determining the lateral margins of the dorsum of the pronotum in the present genus, this measurement indicates the absolute width of the pronotum.

<sup>140</sup> The minimum measurements for these daetyls represent specimens in which these claws are worn down and blunted by much use. This is true of the present specimen.

All gradations are found, however, to a recessive condition in which the dark markings are much reduced, the incursions of pale coloration being considerable, leaving only narrow projections of the dark color laterad between them.

The large series of immature examples taken with the typical series are, with few exceptions, in the instars immediately preceding maturity. In these the coloration averages slightly more recessive than in the adults.

*Biological Notes.*—At the type locality the species was found in great numbers in sandy soil. Tunnels recently made were everywhere apparent. Digging into these and the flooding of such areas revealed few examples, but a row of lettuce in a dying condition was investigated, and beneath the wilted leaves, resting on the ground at the base of these plants, many specimens were found. The roots of the lettuce and other garden plants, such as tomatoes and beets, were found to have been extensively damaged by the present insect, in many cases all but the main tap root having been completely devoured.

When disturbed individuals always sought, if possible, to escape under the ground, disappearing in the sandy soil with astonishing rapidity; on the surface they could run very nimbly, occasionally giving a short hop, but not attempting to fly. There is no doubt, however, that both this species and *vicinus* can fly vigorously, and during migrations, which undoubtedly occur, probably resort almost wholly to this method of locomotion.

At night the rich guttural “grrrrr” of the insect could be heard on all sides, but no individuals were found on the exposed surface of the ground.

*Specimens Examined:* 83; 28 males, 30 females and 25 immature individuals.

Jesup, Georgia, V, 15, 1915, (H.; in burrow under board in grassy field), 1 ♀; X, 1, 1910, 1 ♀, [Ga. State Cln.].

Hebardville, Ga., V, 15, 1915, (H.; in sandy soil of garden), 19 ♂, 18 ♀, TYPE, *allotype*, paratypes, 13 juv.; V, 15 to 31, 1915, (Wm. Walker), 7 ♂, 9 ♀, paratypes, 12 juv., [all Hebard Cln.].

White Oak, Ga., III, 23 and IV, 1904, (A. S. Barnwell), 2 ♂, 1 ♀, [U. S. N. M. and Hebard Cln.].

*Scapteriscus abbreviatus* Scudder. Pl. XIV, figs. 16, 17, 18, 19.

White Oak, Georgia, IV, 1904, (A. S. Barnwell), 1 ♂, 1 ♀, [U. S. N. M. and Hebard Cln.]. Lemon City, Florida, (E. J. Brown), 2 juv., [U. S. N. M.].

The specimens from Georgia, in addition to three from the same locality previously recorded by us,<sup>141</sup> constitute the only record of this species from the United States outside of extreme southern Florida.

***Tridactylus apicalis* Say.**

1862. *T[ridactylus] terminalis* Scudder, Bost. Jour. Nat. Hist., VII, p. 425.  
[Cambridge, Massachusetts; Maryland; southern Illinois.]

*District of Columbia.*

Washington, IX, 1883, 1 ♂, [Hebard  
Cln.].  
Rock Creek, 1 ♀, [U. S. N. M.].

*Virginia.*

Stafford County opposite Fredericks-  
burg, VII, 20, 1913, (R. & H.; wet sand  
near Rappahannock River), 3 juv.

*Georgia.*

Bainbridge, IX, 17 to X, 19, 1910,  
(J. C. Bradley), 1 ♂.  
Spring Creek, Decatur County, V, 7  
to 23, 1911, 1 ♀, 3 juv.; VII, 16 to  
29, 1912, 74 ♂, 31 ♀, 5 juv.; VIII,  
26 to 28, 1913, 1 ♂, 1 ♀, (all J. C.  
Bradley).

We are convinced, after study of the literature and all of the material in our collections, that *terminalis* of Scudder is an absolute synonym of the present species, based solely upon large specimens of pale coloration. We are also satisfied that Scudder has correctly synonymized under these two names the following: *tibialis* Guérin, 1844; *Xya mixta* Haldemann, 1853; *illinoiensis* Thomas, 1863; *fissipes* Saussure, 1874, and *incertus* Saussure, 1896. The great variation in the form of the cephalic limbs in the males of the species discussed by Morse has in part caused this multiplicity of synonyms.

The large series of males before us from Spring Creek, Georgia, shows the same variability of the cephalic tibiae which Morse has remarked, and we find every gradation between the extremes; roughly grouped, sixteen have the tibiae of the normal (♀) form, eight have them very slightly cleft; sixteen have them decidedly and thirty-five very strongly bifurcate. A further interesting feature is apparent in this series, for with scarcely an exception the specimens having these tibiae least specialized are the smallest (averaging in length 7 mm.), and throughout the series a distinct size increase accompanies the greater specialization of the tibiae to its maximum development (these specimens averaging in length 9 mm.).

When compared with the males, the females of this series are found to average noticeably paler in general coloration.

The material before us shows that the wings normally reach a little beyond the apex of the abdomen; occasional series have the wings falling slightly short of this point.

<sup>141</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, p. 272, (1912).



*Ellipes minuta* (Scudder).*District of Columbia.*

Washington, (Aldrich), 3 ♀, [Hebard Cln.].

*Virginia.*

Stafford County opposite Fredericksburg, VII, 20, 1913, (R. & H.; wet sand near Rappahannock River), 1 ♂, 2 ♀, 1 juv.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.; on ground in heavy forest near stream), 1 ♀.

Goldsboro, VII, 25, 1913, (R. & H.; damp ground in short-leaf pine woods), 1 ♂.

Greensboro, VII, 26, 1913, (R. & H.; on wet and almost bare clayey ground), 2 ♂, 5 ♀, 4 juv.

Balsam, VII, 23, 1903, (A. P. Morse), 2 adults.

*South Carolina.*

Spartanburg, VIII, 10, 1903, (A. P. Morse), 1 adult, 2 juv.

Manning, V, 30, 1914, (W. Stone), 1 ♂, 1 ♀, [A. N. S. P.].

*Georgia.*

Burton, 1,800 feet, V, 21, 1911, (J. C. Bradley), 1 ♀.

Rabun County, VII, 1910, (W. T. Davis), 1 ♀.

Jasper, VII, 25, 1903, (A. P. Morse), 1 adult.

Vicinity of Stone Mountain, VIII, 3, 1913, (H.; few on damp sand at edge of bog at base of cliff), 1 juv.

Waycross, VIII, 11, 1903, (A. P. Morse), 1 adult.

Albany, VIII, 1, 1913, (R. & H.; swampy spot on edge of Flint River), 1 ♀.

Spring Creek, Decatur County, VII, 16 to 29, 1912, (J. C. Bradley), 2 ♂.

We are certain that Scudder has correctly synonymized *Tridactylus histrionicus* and *T. histrio* of Saussure, 1896, under the present species. All of the large series before us show the presence or absence of minute subapical natatory lamellæ on the dorsal margins of the caudal tibiæ to be due to individual variation. The maximum number of these in the present species is two on the external and one on the internal margin, a feature noted by Saussure in his description of *histrio*, while his *histrionicus* represents material lacking these rather rudimentary appendages; *minuta* was at that time overlooked by Saussure.

But one specimen in the series here recorded, from Spring Creek, Georgia, is macropterous; the larger series before us show occasional specimens in this condition, some which are semi-macropterous, while many, as in the present series, have the wings wholly concealed by the tegmina.

This insect is found on wet sand near water, often in great numbers, over the entire territory at present under consideration.

*Myrmecophila pergandei* Bruner.

Retreat, North Carolina, VIII, 6, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

Balsam, N. C., VII, 23, 1903, (A. P. Morse), 1 ♂, 1 juv. ♀; 4,500 to 5,700 feet, VII, 24, 1903, (A. P. Morse),

1 ♂, 1 ♀.

Clayton, Georgia, VI, 1909, (W. T. Davis), 1 juv. ♂, 1 juv. ♀.

Crescent City, Florida, 1 juv ♂, [Hebard Cln.].

This species was described from the "Atlantic States, from Maryland southward," it has since been recorded from Washington, District of Columbia, and Georgia, over the area here considered.

The study of the present genus by Schimmer<sup>142</sup> is by far the most complete work on the subject to be found in the literature.

Paratypes from Washington were taken with *Cremastogaster lineolata* Say and *Formica pallidefulva* Latreille. The specimens from Balsam were with *Camponotus herculeanus* Linnæus subspecies *pennsylvanicus* De Geer, and those from Clayton with *Cremastogaster lineolata* Say variety near *pilosa* Pergande.<sup>143</sup>

**Cryptoptilum antillarum** (Redtenbacher).

*South Carolina.*

Isle of Palms, VIII, 15, 1913, (R.: beaten from bayberry, *Myrica cerifera*), 1 ♂, 1 ♀, 2 juv. ♀.

*Georgia.*

Montgomery, VII, 27, 1913, (J. C. Bradley), 1 ♂.

Tybee Island, VII, 26, 1913, (J. C. Bradley), 11 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀.

St. Simon's Island, VIII, 5, 1912, (J. C. Bradley), 1 ♂.

Billy's Island, V, 28 to VII, 2, 1912, (J. C. Bradley), 1 ♂.

This species has been fully treated by the present authors;<sup>144</sup> in that paper the records from Miami (under bark of fallen trees) and Lake Worth (on sand), Florida,<sup>145</sup> were overlooked.

**Cryptoptilum trigonipalpus** Rehn and Hebard.

*Virginia.*

Petersburg, VII, 23, 1913, (R. & H.; undergrowth in heavy oak woods), 1 juv. ♂.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 1 juv. ♀.

*South Carolina.*

Columbia, VII, 28, 1913, (H.; beaten from heavy green undergrowth in short-leaf pine forest on hillside), 1 juv. ♀.

*Georgia.*

Vicinity of Stone Mountain, VIII, 3, 1913, (R. & H.; beaten from tangled undergrowth of short-leaf pine forest), 2 juv. ♀.

Augusta, VII, 29, 1913, (R. & H.; beaten from undergrowth near stream in flat short-leaf pine woods), 3 juv. ♀.

Savannah, VIII, 14, 1903, (A. P. Morse), 1 ♂, 3 ♀.

Warm Springs, 850 to 1,200 feet, VII, 9 and 10, 1913, (R.), 2 juv. ♂, 4 juv. ♀.

Albany, VIII, 1, 1913, (R. & H.; rather common in tangles of small bushes and vines in open forest along banks of Flint River), 4 juv. ♂, 6 juv. ♀.

Spring Creek, VIII, 26 to 28, 1913, (J. C. Bradley), 3 ♂, 1 ♀.

Billy's Island, IX, 1 to 5, 1913, (J. C. Bradley), 2 ♀.

The known distribution of the present species is carried considerably inland, westward and northward, by the above records.

<sup>142</sup> *Zeitschr. Wissensch. Zool.*, XCIII, pp. 409-534, (1909).

<sup>143</sup> The identifications of the ant hosts given here have been most kindly furnished by Professor Wm. M. Wheeler. Bruner, with the original description of the present species, gives the ant hosts as *Camponotus pennsylvanicus*, *Formica rufa* and *Cremastogaster lineolata*. His *Formica rufa* determination is based on the specimens correctly recorded above as *Formica pallidefulva*.

<sup>144</sup> *PROC. ACAD. NAT. SCI. PHILA.*, 1912, pp. 196-201, figs. 5-8, (1912).

<sup>145</sup> Mrs. A. T. Slosson, as *Mogosoplistus slossoni*. *Ent. News*, XII, p. 11, (1901).

The insect reaches maturity about the middle of August over a large portion of its range.

**Cycloptilum squamosum** Seudder.

*North Carolina.*

Goldsboro, VII, 25, 1913, (R. & H.),  
1 juv. ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.;  
undergrowth of mixed deciduous and  
pine forest), 2 juv. ♀.

Columbia, VII, 28, 1913, (R. & H.;  
immature individuals very abundant  
among pine needles in long-leaf  
pine woods), 1 juv. ♂, 2 juv. ♀.

*Georgia.*

Toccoa, 1,094 feet, VIII, 4-5, 1913,  
(H.), 2 juv. ♀.

Jasper, 1,550 feet, VIII, 5, 1913, (R.;  
undergrowth of pine woods), 1  
juv. ♀.

Vicinity of Stone Mountain, VIII, 3,  
1913, (R. & H.; beaten from tangled  
undergrowth of pine forest), 1  
juv. ♂.

Macon, VII, 30-31, 1913, (R. & H.;  
few immature individuals in oak  
leaves on edge of oak and short-leaf  
pine woods), 2 juv. ♂, 1 juv. ♀.

Warm Springs, 850 to 1,200 feet, VIII,  
9-10, 1913, (R.; beaten in pine and  
oak woods), 1 ♂, 3 ♀, 2 juv. ♀.

Albany, VIII, 1, 1913, (R. & H.),  
1 juv. ♂.

This species has been fully treated by the present authors,<sup>146</sup> it is now known to range northward to East Marion, Long Island, New York.<sup>147</sup>

**NEMOBIUS** Serville.

The species of the present genus found in North America north of the Isthmus of Panama have been fully treated by the present junior author.<sup>148</sup> In that paper nearly all of the material in the collections now before us, taken previous to 1913, was recorded. The localities for these series are first given below, then the subsequent records are given in full with whatever comments appear of interest.

**Nemobius fasciatus fasciatus** (De Geer).

Chestertown, Beltsville, Montgomery County, Plummer's Island and Hyattsville, Maryland; Washington, District of Columbia; Fairfax County, Falls Church, Rosslyn and Bayville, Virginia; Jefferson, Cranberry, Grandfather Mountain, Blowing Rock, Black Mountain, Asheville, Mount Pisgah, Balsam and Waynesville, North Carolina, and Atlanta and Thompson's Mills, Georgia.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. &  
H.), 5 ♂, 7 ♀, 2 juv. ♂.  
Orange, VII, 21, 1913, (R. & H.),  
1 juv. ♂.

Lynchburg, VII, 22, 1913, (R. & H.),  
1 juv. ♂.  
Petersburg, VII, 23, 1913, (R. & H.),  
1 juv. ♀.

<sup>146</sup> PROC. ACAD. NAT. SCI. PHILA., 1912, pp. 209-214, figs. 17-19, (1912).

<sup>147</sup> Davis, *Jour. N. Y. Ent. Soc.*, XXII, p. 171, (1914).

<sup>148</sup> PROC. ACAD. NAT. SCI. PHILA., 1913, pp. 394-492, (1913).

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.),  
2 juv. ♂.  
Charlotte, VII, 27, 1913, (R. & H.),  
1 ♂, 1 ♀.

*South Carolina.*

Spartanburg, VIII, 6, 1913, (H.),  
1 juv. ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 1 juv. ♀.  
Toccoa, VIII, 4-5, 1913, (H.), 1 juv. ♀.  
Jasper, VIII, 5, 1913, (R.), 1 ♀,  
1 juv. ♂.  
Atlanta, VIII, 2 and 6, 1913, (Bradley and R. & H.), 3 ♂. 1 ♂ macropterous.

In late July, 1913, immature individuals of the species were found everywhere very numerous in fields in the Piedmont region of Virginia and North Carolina.

Immature individuals of the races of this species are easily separable from those of other southeastern species of the genus, as they alone have a medio-longitudinal dorsal dark stripe on the abdomen, down the centre of which an often well-defined very narrow pale line is usually found. In addition, the lateral lobes of the pronotum are usually heavily marked with a broad dark band, which is often continued on the sides of the abdomen.

***Nemobius fasciatus socius* Seudder.**

Raleigh, Newbern, Fayetteville, Hamlet, Lake Waccamaw, Wilmington, Winter Park, Southport and Smith Island, North Carolina; north end of Sullivan Island and Yemassee, South Carolina; Tybee Island, Brunswick, Cumberland Island, Billy's Island, Homer-ville, Thomasville and Bainbridge, Georgia, and Atlantic Beach, Pablo Beach and Jacksonville, Florida.

Goldsboro, North Carolina, VII, 25, 1913, (R. & H.), 1 ♂, 1 ♀.  
Augusta, Georgia, VII, 29, 1913, (R. & H.); common, untillied field among grasses), 3 ♀.

Macon, Ga., VII, 30-31, 1913, (R. & H.), 1 ♂, 4 ♀.  
Albany, Ga., VIII, 1, 1913, (R. & H.), 5 ♂, 2 ♀, 1 juv. ♂. 1 ♂ macropterous.

***Nemobius maculatus* Blatchley.**

Cabin John Run and Plummer's Island, Maryland; Washington, District of Columbia; Fairfax County, Alexandria County, Cherrydale and Dead Run, Virginia, and Raleigh, North Carolina.

Cabin John Run, Maryland, IX, 1911, (W. T. Davis), 1 ♀, [Hebard Cln.].  
Fredericksburg, Virginia, VII, 20, 1913, (R. & H.), 1 juv. ♂, 2 juv. ♀.  
Petersburg, Va., VII, 23, 1913, (R. & H.), 4 juv. ♂, 1 juv. ♀.

Weldon, North Carolina, VII, 24, 1913, (R. & H.), 1 juv. ♂.  
Pinnacle Peak, Rabun County, Georgia, VIII, 20, 1913, (J. C. Bradley), 1 ♀.  
Vicinity of Stone Mountain, Ga., VIII, 3, 1913, (H.), 1 juv. ♀.

Immature individuals of this species are readily separable from those of other forms found in this territory. They are brownish, somewhat mottled with a paler color, and have the lateral lobes of the pronotum occasionally darkened. Confusion with material of the early instars

of *N. carolinus* would alone be possible, and the unequal dorsal pair of distal spurs of the caudal tibiae readily separates them from these.

The series recorded above was found scarce on banks of stream in woods (Fredericksburg), not scarce in boggy spot of grasses in woods (Petersburg), along stream in heavy forest (Weldon) and in bog at foot of precipice (vicinity of Stone Mountain).

The species was not previously correctly recorded<sup>149</sup> from the southeastern United States south of the vicinity of Washington, except from Raleigh, North Carolina.

**Nemobius griseus funeralis** Hart.

Macon, Georgia, VII, 30, 31, 1913, (R. & H.), 1 ♀.

It is with great satisfaction that we find a specimen of this distinctive insect, known previously from the unique female type taken at College Station, Texas, in the material from Georgia before us. We find, moreover, a male, taken at Winslow, Arkansas, September 3, 1905, by Morse, in the Morse Collection.

*Measurements (in millimeters).*

	♂ Winslow, Ark.	♀ Macon, Ga.
Length of body.....	8.9	9.2
Length of pronotum.....	2	1.9
Caudal width of pronotum.....	2.6	2.4
Length of tegmen.....	5.8	3.8
Length of caudal femur.....	6.6	6
Greatest width of caudal femur.....	2.3	2
Length of ovipositor.....		4.4

**Nemobius ambitiosus** Seudder.

Florence, South Carolina; Thompson's Mills, Jesup, Spring Creek, Thomasville, Homerville, Suwannee Creek, Billy's Island, Honey Island, St. Simon's Island and Cumberland Island, Georgia, and Jacksonville, Atlantic Beach, Pablo Beach, San Pablo, Live Oak and Georgia State Line of Leon County, Florida.

<i>Georgia.</i>	Billy's Island, IX, 1-5, 1913, (J. C. Bradley), 2 ♀.
Rabun County, VII, 1910, (W. T. Davis), 1 ♂.	Albany, VIII, 1, 1913, (R. & H.), 5 ♂, 6 ♀.
Toccoa, VIII, 4-5, 1913, (H.), 2 juv. ♂.	Spring Creek, VIII, 26-28, 1913, (J. C. Bradley), 2 ♂, 1 ♀.
Hebardville, V, 15, 1915, (H.), 1 ♂, 1 ♀, 1 juv. ♂.	<i>Florida.</i>
Mixon's Hammock, V, 16, 1915, (H.), 1 ♀.	Ortega, IX, 6, 1913, (W. T. Davis), 1 ♀.

<sup>149</sup> Specimens of *N. fasciatus* from Jefferson, North Carolina, now before us, were incorrectly recorded by Sherman and Brimley as *N. maculatus* (*Ent. News*, XXII, p. 391, (1911)).



A female from Billy's Island and one from Albany are black in general coloration. Immature individuals are brown in general coloration, often tinged with reddish and flecked with darker brown; the distinctive cephalic markings are as well defined as in the adult condition.

The series recorded above was found in the undergrowth of the long-leaf pine woods (Hebardville, Albany), in dry leaves under live oak (Mixon's Hammock) and immature individuals were found occasional in oak leaves (Toccoa).

The records given above include the northernmost localities known for the species.

**Nemobius bruneri** Hebard.

Cabin John Run and Plummer's Island, Maryland; Washington, District of Columbia, and Glencarlyn, Virginia.

*Virginia.*

Rosslyn, X, 14, (A. N. Caudell), 3 ♂,  
[U. S. N. M.].

Arlington, VII, 9, 1914, (H.), 1 juv. ♂,  
1 juv. ♀.

Fredericksburg, VII, 20, 1913, (R. &  
H.), 4 juv. ♂, 2 juv. ♀.

Orange, VII, 20, 1913, (R. & H.),  
2 juv. ♂.

*North Carolina.*

Greensboro, VII, 26, 1913, (R. & H.),  
2 juv. ♂.

Charlotte, VII, 27, 1913, (R. & H.),  
4 juv. ♂.

Immature individuals of this species are very striking, being pale reddish brown in general coloration speckled with much darker brown, by which dark color the lateral lobes of the pronotum and first and fifth abdominal segments are heavily suffused. These latter markings give a distinctive barred appearance in very young individuals, which becomes less strongly defined in successive instars to those preceding maturity, in which these markings are not strongly indicated.

The species was found abundant in damp leaves in and along the border of a deciduous woodland on high ground near a stream (Fredericksburg) and scarce in leaves on edge of a deciduous forest (Orange).

No other records, other than those given above, have been published for the species in the territory at present under consideration.

**Nemobius cubensis cubensis** Saussure.

Montgomery County, Maryland; Washington, District of Columbia; Raleigh, North Carolina; Florence, South Carolina; Jesup, Georgia, and Jacksonville, Florida.

Albany, Georgia, VIII, 1, 1913, (R. &  
H.), 2 ♂, 2 ♀. All brachypterous.

Bainbridge, Ga., VII, 15-27, 1909,  
(J. C. Bradley), 1 ♂. Macropterous.

The species was found occasional in swampy spots (Albany).

The above records include all the localities known for the species over the territory at present considered. The species has been found as far north as Staten Island, New York, and southward appears to reach its greatest abundance in the United States in peninsular Florida.

**Nemobius palustris palustris** Blatchley.

Washington, District of Columbia, and Fayetteville, Lake Waccamaw and Wilmington, North Carolina.

These, the southernmost-known records for this insect, include all the localities known for it over the area now being studied.

**Nemobius carolinus carolinus** Scudder.

Cabin John Run and Plummer's Island, Maryland; Washington, District of Columbia; Alexandria County, Dead Run, Rosslyn, Fairfax County and Falls Church, Virginia; Raleigh, Blowing Rock, Newton, Black Mountain, Balsam, Highlands, Fayetteville and Lake Waccamaw, North Carolina; Florence, Swansea and north end of Sullivan Island, South Carolina; Thompson's Mills, Brunswick, Thomasville and Bainbridge, Georgia, and Daytona, Florida.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 2 juv. ♂.

Charlotte, VII, 27, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.  
Goldsboro, VII, 25, 1913, (R. & H.), 2 ♂, 3 ♀.

*North Carolina.*

Jefferson, IX, 1912, (F. Sherman), 1 ♂, [N. C. State Dept. Agr. Cln.].  
Grandfather Mountain, 4,000-5,000 feet, IX, 1915, 1 ♂, [Hebard Cln.].  
Blowing Rock, IX, 1915, (F. Sherman), 1 ♂, [N. C. State Dept. Agr. Cln.].

*Georgia.*  
Pinnacle Peak, VIII, 20, 1913, (J. C. Bradley), 2 ♀.  
Jasper, VIII, 5, 1913, (R.), 1 juv. ♂.  
Billy's Island, IX, 1-5, 1913, (J. C. Bradley), 1 ♂.  
Spring Creek, VII, 16 to VIII, 26, 1912 and 1913, (J. C. Bradley), 1 ♂, 3 ♀.

Immature individuals of this species and of *N. confusus* are more glabrous in general appearance than any others found in the area here considered. The general color is dark brown, the four rows of large pale spots on the dorsal abdominal segments first appearing in the instars immediately preceding maturity.

The present common insect is found everywhere over the region now being studied.

**Nemobius confusus** Blatchley.

Cabin John Run and Plummer's Island, Maryland; Dead Run, Falls Church and Alexandria County, Virginia, and Raleigh, North Carolina.

Rabun County, Georgia, VII, 1910, (W. T. Davis), 2 juv. ♂, 1 juv. ♀.

Buckhead, Ga., VIII, 2, 1913, (H.; undergrowth in mixed oak and pine forest), 1 juv. ♀.

The very dark general coloration of immature examples of this species and the bone white maxillary palpi, make them readily separable from those of any other species found in the regions here treated.

In the southeastern United States the species was not previously known except from Raleigh, North Carolina.

A single immature specimen was found in woods of oak and pine (Buckhead).

**Anurogryllus muticus** (DeGeer).<sup>150</sup>

*New Jersey.*

Ocean View, VI, 11 and 17, 1911 and 1912, (H. Fox), 2 ♂, [A. N. S. P.].

*District of Columbia.*

Washington, (Chittenden), 2 ♀, [U. S. N. M.].

*Virginia.*

Clarendon, VI, 8, 1914, (H. A. Allard), 4 ♂, [U. S. N. M.].

Falls Church, VIII, 1 ♀, [U. S. N. M.].

Charlottesville, V, 26, 1914, (H. Fox), 1 ♂, [Hebard Cln.].

*North Carolina.*

Raleigh, V, 30, 1905, 1 ♂, [U. S. N. M.]; VI, 1911 to 1915, (C. S. Brimley), 4 ♂, 1 ♀, [Brimley Cln. and N. C. State Dept. Agr.].

*South Carolina.*

Beech Island, V, 14, 1903, (Hammond), 1 ♀, [U. S. N. M.].<sup>151</sup>

*Georgia.*

Hebardville, V, 15, 1915, (H.), 4 ♂.

*Florida.*

Jacksonville, IV, 1885, (W. H. Ashmead), 1 ♀, [Hebard Cln.]; winter of 1880-1881, (W. H. Ashmead), 1 ♀, [U. S. N. M.].

Lawtey, X, 12 and 28, 1886, (M. Venickerbocker), 2 juv. ♂, 3 juv. ♀, [U. S. N. M.].

Gulf Hammock, Levy County, IV, 7, 1903, (P. Laurent), 3 juv. ♀, [Hebard Cln.].

De Land, 2 juv. ♀, [U. S. N. M.].

*Alabama.*

Auburn, V, 6, 1911, (W. E. Hinds), 1 ♀, [U. S. N. M.].

Daphne, VI, 9, 1894, (L. Sauterre), 2 ♀, [U. S. N. M.].

*Louisiana.*

Jena, La Salle Parish, V, 7, 1887, (M. Dempsey), 1 ♀, [U. S. N. M.].<sup>152</sup>

*Texas.*

Victoria, IV, 24, 1915, (J. D. Mitchell), 2 ♀, 1 juv. ♀, [U. S. N. M.].

This insect is one of the very plastic and widely distributed American species of the group Gryllites. We find not only *guadeloupensis*, *angustulus* and *caribeus* to be synonyms of this species, as indicated by Kirby,<sup>153</sup> but also *Gryllodes clarazianus* of Saussure,<sup>154</sup> which form was later placed in the present genus by its author. This Argentinian variant, of which we have material before us, has been

<sup>150</sup> This species has twice been recorded by Caudell from the United States in error as *A. antillarum*. See footnote 152 and *Proc. Entom. Soc. Wash.*, VI, p. 49, (1904), [Southern United States].

<sup>151</sup> Correctly recorded by Hammond (*Bull. 44, Bur. of Entom., U. S. Dept. of Agr.*, p. 94, (1904)).

<sup>152</sup> Recorded as *antillarum* with Florida, South Carolina, Virginia and Alabama state records by Caudell (*Bull. 44, Bur. of Entom., U. S. Dept. of Agr.*, p. 88, (1904)).

<sup>153</sup> *Syn. Cat. Orth.*, II, p. 24, (1906).

<sup>154</sup> *Miss. Sci. Mex.*, *Rech. Zool.*, VI, p. 412, pl. VIII, fig. 31, (1874). [Bahia Blanca, Argentina.]

separated from *muticus* as found in the Guianas,<sup>155</sup> by the head being marked with four pale longitudinal lines and the caudal metatarsus being shorter and broader with dorsal margin more distinctly arcuate. The head marking appears often, though usually not strongly defined, being particularly apparent in immature examples or adults of pale general coloration, over nearly the entire distribution of the species.<sup>156</sup> Various series show that the metatarsal length and heaviness is extremely variable in the species, though often uniform in large series from the same general region.<sup>157</sup> Variations in tegminal and wing length, and in the caudal metatarsus, are principally the cause of the above synonymy, though other variations, decidedly puzzling without large series being available for comparison, also occur.

Within the boundaries of the United States the species shows appreciable differences from material from the Guianas; these differences due, in our opinion, to an adaptation to the differences in environment and climate, but, considering the plasticity of the species, neither sufficiently constant or well marked to warrant the recognition of a geographic race. The most noteworthy of these are: the somewhat more evenly rounded and protuberant occiput; slightly weaker inter-antennal protuberance; slightly less prominent eyes; more nearly quadrate dorsum of the pronotum, with caudal margin straight or weakly convex (never weakly bisinuate as in typical *muticus*); color frequently decidedly paler, with the pale marking at the ventro-cephalic angle of the lateral lobes of the pronotum (usually conspicuous in typical *muticus*) subobsolete.

Along the Atlantic coast of the United States the species is usually found to have the metatarsus very slightly longer than is typical, but of similar proportions; specimens from Alabama westward, however, have the metatarsus distinctly shorter and slightly heavier.

The examples from Victoria, Texas, have the occiput more distinctly striped than in any but Argentinian material before us. Great variation in intensity of coloration is shown in the series here recorded; although these specimens average decidedly paler than tropical material of the species, the four adults from Hebardville,

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<sup>155</sup> A large series now before us from British Guiana appears to be in every way typical.

<sup>156</sup> This marking being less apparent in adults of intensive coloration, it is not surprising to find few of these in tropical series which are usually dark in general coloration.

<sup>157</sup> We are able to ascertain this fact from very large series now before us from the West Indies, Central and South America.

Georgia, are as dark as any specimens before us, but have the lateral lobes of the pronotum entirely pale.

In the United States the males have the tegmina reaching to, or falling slightly short of, the apex of the abdomen; the females have the tegmina never less than half the abdominal length, frequently about two-thirds that length, though more variable than the males in this feature. Of the above series two females (Washington) are macropterous, one female (Victoria) has a single caudate but imperfect wing, while one female (Falls Church) has long tegmina but aborted wings.

It might seem that geographic races could be recognized, but careful study, of this and much larger tropical American series, shows that variation such as discussed above occurs in an endless complexity, and that intermediates of every sort occur between conditions which might easily be supposed, without sufficient material for comparison, to represent geographic races or even closely related species. The form of the male titillatores is the same in all of the material of the species examined.

In the United States adults of the species appear in April, May and June, later than this individuals are scarcely ever encountered.

The present insect has long been known to be very destructive in the southeastern United States, damaging cotton, tobacco, sweet and white potatoes, strawberries, peas and other farm products. The series here recorded was taken: in fence corner and in truck patch (Ocean View), in cotton field (Beech Island and Auburn), on fences and walls of yard of bermuda grass, stridulating at dusk (Hebardville) and injuring strawberries (Lawtey).

The records given above define the known range of the species in the United States.

***Gryllus assimilis* Fabricius.**

Recent studies have shown this to be the only native representative of the genus found in America.<sup>158</sup> Great variation, however, exists and we have found the variants to be best represented by symbols.<sup>159</sup> Of these, the following four are found in the regions at present under consideration:

B, suffused Z, (normally d or e, w), (45 to 2, the latter weakly 0); *scudderianus*.

AU, (normally ax), 4; *neglectus*.

<sup>158</sup> Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1915, pp. 293-322, (1915).

<sup>159</sup> See PROC. ACAD. NAT. SCI. PHILA., 1915, pp. 299, 300, (1915).



AV, (normally a or b but ranging to f, x but often u), 3; *pennsylvanicus*.

AW, (normally d but ranging from a to f, w but often u), 3; *luctuosus*.

Of these, *scudderianus* is apparently an adaptation to an arenaceous surrounding, it is found locally as far north as Indiana, at the more northern points showing an average less robust form and smaller size (such material constituting the bases of the names *scudderianus*, *rubens* and *arenaceus*), while in southern Florida and on the Gulf coast an average more robust form and larger size is developed (upon such material *firmus* was in part founded).

The other three variants intermingle more generally, though individuals of each occasionally show the transition toward the *scudderianus* variant. The darkest of these, *neglectus*, is found in the north, only appearing well defined, in the area here considered, in the Appalachian mountains south as far as their highest points in north Georgia. Over the entire region *pennsylvanicus* appears generally, but is the most frequent condition met with on the Piedmont plateau, while *luctuosus* is the normal condition everywhere on the coastal plain in the regions here considered.<sup>160</sup>

Material can be grouped for convenience under these variant designations, but in such treatment it must be remembered that nearly every specimen of each series will show different degrees of coloration, femoral and ovipositor length and every other feature, excepting those diagnostic qualities common to all of the variants of *G. assimilis*.

In the paper in which these facts are fully treated, the exact condition of the material from the collections at present being studied is given,<sup>161</sup> the localities being: Chestertown, Glen Echo and Jennings, Maryland; Washington, District of Columbia; Roslyn, Virginia; Winter Park and Lake Waccamaw, North Carolina; Florence, Sullivan Island and Yemassee, South Carolina; Rabun Bald, Black Rock Mountain, Tuckoluge Creek, Clayton, Atlanta, vicinity of Stone Mountain, Augusta, Jesup, Waycross, Hebardville, Billy's Island, St. Simon's Island, Cumberland Island, Fargo, Chester, Bainbridge and Spring Creek, Georgia, and Atlantic Beach, Pablo Beach, Burnett's Lake and Live Oak, Florida.

<sup>160</sup> It is this condition which the present authors had frequently recorded as *G. rubens* from the southeastern United States.

<sup>161</sup> PROC. ACAD. NAT. SCI. PHILA., 1915, pp. 305-307, (1915).

**Gryllus domesticus** Linnaeus.

This species, accidentally introduced by man from Europe, has been recently recorded by us<sup>162</sup> from "Carolina" and Roswell, Albany and Thomasville, Georgia, within the territory at present under consideration.

**Miogryllus verticalis** (Serville).

The American species of this genus have recently been fully studied and reported upon by the junior author.<sup>163</sup>

Material from the present collections from College Park and Plummer's Island, Maryland; Washington, District of Columbia; Falls Church, Virginia; Raleigh and Goldsboro, North Carolina; Columbia, South Carolina; Clayton, Sand Mountain, Trenton, Augusta, Tybee Island, Mixon's Hammock in Okeefenokee Swamp and Billy's Island, Georgia, and Jacksonville, Atlantic Beach and Marianna, Florida, is treated in that paper. In addition we now have the following specimens:

Raleigh, North Carolina, late VI, 1911,  
(C. S. Brimley), 2 ♀, 1 macropterous,<sup>164</sup> [Brimley Chn.].

Hebardville, Georgia, V, 15, 1915, (H.),  
1 juv. ♀, 1 very small juv. ♀.  
Billy's Island, Ga., V, 16, 1915, (H.),  
1 juv. ♀.

**Gryllodes sigillatus** (Walker).

Though not as yet known from Florida as far north as the region treated in the present paper, this species is apparently rapidly extending its distribution northward.

It has been reported by Davis from as far north in Florida as Lakeland, and recently the junior author found it widely distributed in that town, particularly about grocery stores, where, on May 21, 1915, a single male was taken to verify this observation.

**Œcanthus niveus** (DeGeer).

Cranberry, North Carolina, VIII, 1896, (H. Skinner), 1 ♂, [A. N. S. P.].

This species has been very widely discussed in past literature, principally owing to its economic importance, but very general confusion with both *O. exclamationis* and *O. angustipennis* prevents the use of the majority of these records in distributional studies.

<sup>162</sup> PROC. ACAD. NAT. SCI. PHILA., 1915, pp. 320-322, (1915).

<sup>163</sup> Jour. N. Y. Ent. Soc., XXIII, pp. 101-121, (1915).

<sup>164</sup> This specimen is of particular interest in being the first macropterous example of the species to be reported from temperate regions. Four other macropterous specimens are known from the tropics, the type and three individuals of the series of one hundred and twenty-two examples which were before the junior author at the time the genus was revised. In the present example the internal face of the cephalic tibiae bears a but weakly defined tympanum; the measurements are: length of body 13.7, of pronotum 2.3, of tegmen 6, of wing 16.7, of caudal femur 9, of ovipositor 10.3 mm.

We know it to be found on the Atlantic coast as far north as Windsor, Connecticut. Thompson's Mills, Georgia, is the only previous definite record for the southeastern United States. The species is both dendrophilous and thamnophilous, appearing usually in greatest numbers in shrubs with pithy branches, in which the females deposit their eggs.

***Ecanthus angustipennis* Fitch.**

*North Carolina.*

- Raleigh, X, 18, 1905, 1 ♀; XI, 2, 1904, (G. M. Bentley), 1 ♀, [both N. C. Dept. Agr. Cln.].  
 Southern Pines, XI, 1908, (A. H. Manee), 2 ♀, [N. C. Dept. Agr. and Hebard Cln.].  
 Mount Airy, XI, 16, 1904, (G. M. Bentley), 1 ♀, [N. C. Dept. Agr. Cln.].  
 Saluda, VIII, 17, 1903, (A. P. Morse), 1 juv. ♀.  
 Balsam, about 4,000 feet, IX, 15-18, 1908, (Z. P. Metcalf), 1 ♀, [N. C. State Dept. Agr. Cln.].

*South Carolina.*

- Florence, IX, 6, 1911, (R. & H.; in forest foliage), 1 ♀.

*Georgia.*

- Pinnacle Peak, Rabun County, VIII, 20, 1913, (J. C. Bradley), 1 ♀.  
 Currahee Mountain, VIII, 5, 1913, (H.; beaten from luxuriant vegetation, vines, oak shoots, etc., in black-jack woods), 1 juv. ♂.  
 Buckhead, VIII, 2, 1913, (R. & H.), 1 juv. ♂.  
 Isle of Hope, IX, 3, 1911, (R. & H.; heavy undergrowth of gray-bark pine forest), 1 ♀.  
 Albany, VIII, 1, 1913, (R. & H.), 1 juv. ♀.  
 De Witt, VII, 25, 1912, 1 ♀, [Ga. State Cln.].  
 Spring Creek, VII, 16-29, 1912, (J. C. Bradley), 1 ♀.

Hartford, Connecticut, is the most northern location on the Atlantic coast at which we know the species to occur. Past confusion with other species makes distributional studies from the literature, in almost every case, impossible. The species has been taken and recorded by us from as far south as Lakeland, Florida. It has been correctly recorded in the regions under consideration from Bayville, Virginia; Raleigh and Asheville, North Carolina, and Toccoa and Thompson's Mills, Georgia. Like *O. niveus*, the species is both dendrophilous and thamnophilous.

***Ecanthus quadripunctatus* Beutenmüller.**

*Virginia.*

- Fredericksburg, VII, 20, 1913, (R. & H.; occasional, especially juv., in weeds in open), 1 ♂, 1 ♀.  
 Cape Henry, VII, 2 and IX, 7, 1903, (A. P. Morse), 2 ♀.  
 Virginia Beach, VII, 4, 1903, (A. P. Morse), 3 ♂.  
 Appomattox, IX, 6, 1903, (A. P. Morse), 1 ♀, 3 juv. ♀.  
 Wytheville, IX, 5, 1903, (A. P. Morse), 3 ♀.

*North Carolina.*

- Weldon, VII, 24, 1913, (R. & H.), 1 ♂.  
 Tarboro, VII, 7, 1903, (A. P. Morse), 3 ♂, 2 ♀.  
 Raleigh, VII, 9, 1903, (A. P. Morse), 1 ♂, 5 ♀.  
 Goldsboro, VII, 25, 1913, (R. & H.), 1 ♂.  
 Jefferson, IX, 1912, (F. Sherman), 1 ♀, [N. C. State Dept. Agr.].  
 Morganton, VII, 12, 1903, (A. P. Morse), 3 ♂, 2 ♀.

- Saluda, VIII, 17, 1903, (A. P. Morse), 1 ♀.  
 Asheville, VII, 21, 1903, (A. P. Morse), 1 juv. ♀.  
 Balsam, 4,000 feet, IX, 15-18, 1908, (Z. P. Metcalf), 1 ♀, [N. C. State Dept. Agr.].  
 Wrightsville, IX, 7, 1911, (R. & H.), 6 ♂, 3 ♀.  
 Winter Park, IX, 7, 1911, (R. & H.), 2 ♂, 3 ♀.  
 Lake Waccamaw, IX, 8, 1911, (R. & H.), 1 ♂, 2 ♀.
- Tennessee.*  
 Roan Mountain Station, IX, 3, 1903, (A. P. Morse), 6 ♂, 1 ♀.
- South Carolina.*  
 Florence, IX, 6, 1911, (R. & H.), 1 ♀.  
 Columbia, VII, 28, 1913, (R. & H.), 2 ♂, 4 ♀.
- Georgia.*  
 Rabun County, VII, 1910, (W. T. Davis), 1 juv. ♂.  
 Currahee Mountain, VIII, 5, 1913, (H.), 1 ♂.  
 Augusta, VII, 29, 1913, (R. & H.; waste field), 1 ♂, 1 ♀.  
 Stone Mountain, VII, 28, 1903, (A. P. Morse), 1 juv. ♂.  
 Bolton, VII, 29, 1903, (A. P. Morse), 2 ♂.  
 Jasper, VIII, 5, 1913, (R.), 1 juv. ♂, 1 juv. ♀.
- Chickamauga, VII, 10, 1898, (H. L. Viereck), 1 ♂, [A. N. S. P.].  
 Trenton, VII, 10, 1905, (A. P. Morse), 1 ♂, 1 ♀.  
 Macon, VII, 30-31, 1913, (R. & H.), 1 ♂, 5 ♀.  
 West Point, VII, 30, 1903, (A. P. Morse), 1 ♂.  
 Oglethorpe, VII, 1, 1910, (J. C. Bradley), 1 ♂, 1 ♀.  
 Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♂.  
 Tybee Island, VII, 26, 1913, (J. C. Bradley), 1 ♀; VIII, 13, 1903, (A. P. Morse), 1 juv. ♂.  
 Billy's Island, VI, 1912, (J. C. Bradley), 2 ♀.  
 Albany, VIII, 1, 1913, (R. & H.; undergrowth in long-leaf pine forest), 2 ♀.  
 Bainbridge, IX to X, (J. C. Bradley), 1 ♀.
- Florida.*  
 Jacksonville, XI, 3, 1911, (W. T. Davis), 1 ♂.  
 Ortega, IX, 27-28, 1913, (W. T. Davis), 5 ♂, 1 juv. ♂.  
 Newberry, XI, 18, 1911, (W. T. Davis), 1 ♂.  
 Live Oak, VIII, 26, 1911, (R. & H.), 1 ♂, 1 ♀.  
 Tallahassee, VIII, 8, 1903, (A. P. Morse), 1 ♂.

This, the most abundant species of the present genus in the eastern United States, is found almost everywhere over the regions here considered, it has been correctly recorded from as far south in the eastern United States as Fort Myers, Florida. The insect has been frequently recorded in past literature as other species of the genus. The species is more nearly terrestrial than any other of the genus here considered; it is usually found in the open, in weeds and grasses, where it occurs frequently in considerable numbers.

In the above series one specimen, from Live Oak, Florida, has the inner antennal marking greatly reduced, while the outer markings have disappeared. This is very unusual in this species, in which these markings are normally well defined with outline sharp and even.

*Ceanthus nigricornis* Walker.

*Tennessee.*

- Roan Mountain Station, IX, 3, 1903, (A. P. Morse), 12 ♂, 13 ♀.

*North Carolina.*

- Jefferson, IX, 1912, (F. Sherman; C. L. Metcalf), 2 ♂, 1 ♀, [N. C. State Dept. Agr.].

Blowing Rock, VIII, 1905-1906, (R. S. Wolgum; F. Sherman), 2 ♂, 1 ♀, [N. C. State Dept. Agr.].  
 Grandfather Mountain, 4,000 feet, IX, 11, 1908, (Z. P. Metcalf), 3 ♀, [N. C. State Dept. Agr.].

Linville, VIII, 28, 1906, (R. S. Wolgum), 1 ♂, [N. C. State Dept. Agr.].  
 Waynesville, IX, 14, 1909, (Z. P. Metcalf), 2 ♂, [N. C. State Dept. Agr. and Brimley Cln.].  
 Montreat, 3,000 feet, IX, 21-22, 1908, (Z. P. Metcalf), 1 ♀, [Brimley Cln.].

In addition to the normally very distinctive coloration of this insect, it may be further distinguished from the allied *O. quadripunctatus* by the heavier pronotum, the greatest width of which more closely approximates the length of the same than in that species, while the head between the eyes is weakly but distinctly depressed, a condition not at all or rarely very weakly indicated in *quadripunctatus*.

Only a few specimens in the present series do not exhibit the very strongly defined normal type of coloration, these have the dark markings slightly paler, while in a single female the color pattern is still more decidedly recessive and only in part indicated.

We believe the present species to be confined to the Appalachian portion of the regions at present under consideration. It is widely distributed over the north-central and central-eastern portions of the United States and is the most abundant species of the genus in southern Ontario. Numerous records of *nigricornis* and the synonymous *fasciatus* are, however, erroneous. On the Atlantic coast it is known to occur over but a comparatively limited area north of the territory here studied. The insect is found in weeds and low plants in the open, but particularly in tangles of raspberry vines; it is usually locally distributed, but very abundant.

***Æcanthus pini* Beutenmüller.**

1911. *Æcanthus nigricornis* Rehn and Hebard, (not of Walker, 1869), Proc. Acad. Nat. Sci. Phila., 1910, p. 649. [Raleigh, North Carolina.]

Raleigh, N. C., IX, 7 and 22, 1904, (C. S. Brimley; upland field and alders in pine woods), 2 ♀, [Hebard Cln.].

This species shows nearest relationship to *O. nigricornis*, but is somewhat more robust, with coloration and color pattern distinctive and wholly different, with pronotum normally slightly heavier and more nearly quadrate, and with the head between the eyes even more decidedly depressed. The antennal markings are much as in specimens of that species in which such markings are apparent; in *O. quadripunctatus* these markings are very similar, but with outline more abruptly and evenly defined.

The present species, we believe, is wholly arboreal and only found



in pine trees, except when moving from one to another. Its distribution is as yet very imperfectly known; the species was described from [West Woodstock], Windham County, Connecticut. Other records from Riverton and Anglesea, New Jersey; Chestertown, Maryland, and Brownsville, Texas, do not apply to this species, but several from the pine-barrens region of New Jersey we know to be correct.

*Ceanthus latipennis* Riley.

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.; weeds in corner of field near deciduous forest), 2 juv. ♂.

Orange, VII, 21, 1913, (R. & H.; very scarce in undergrowth of chestnut woods), 1 juv. ♂.

Petersburg, VII, 22, 1913, (R. & H.; scarce in undergrowth of pine woods), 2 juv. ♂.

Appomattox, IX, 6, 1903, (A. P. Morse), 1 ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.; undergrowth in low pine woods), 2 juv. ♂, 1 juv. ♀.

Goldsboro, VII, 25, 1913, (R. & H.; vegetation in damp places of short-leaf pine woods), 2 juv. ♂, 1 juv. ♀.

Fayetteville, IX, 9, 1911, (R. & H.; beaten from low oaks in short-leaf pine woods), 1 ♂, 1 ♀.

Greensboro, VII, 26, 1913, (R. & H.), 1 juv. ♂.

Saluda, VIII, 17, 1903, (A. P. Morse), 1 juv. ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.; scrub oaks in short-leaf pine forest), 3 ♂, 5 ♀.

Ashley Junction, VIII, 15, 1913, (R.; beaten from undergrowth in long-leaf pine woods), 1 juv. ♂.

*Georgia.*

Toccoa, VIII, 4, 1913, (H.; beaten from heavy, low scrub oaks), 1 juv. ♂.

Jasper, VIII, 5, 1913, (R.; beaten from scrub), 1 juv. ♀.

Sharp Mountain near Jasper, VIII, 6, 1913, (R.; beaten from blackberry and oak shoots), 1 juv. ♂.

Buckhead, VIII, 2, 1913, (R. & H.; oak shoots in oak woods), 1 juv. ♂, 1 juv. ♀.

Dalton, VIII, 7, 1913, (R.; beaten, on hillside), 1 juv. ♀.

Sand Mountain, VIII, 25, 1903, (A. P. Morse), 1 juv. ♂, 1 juv. ♀.

Warm Springs, VIII, 9-10, 1913, (R.), 2 juv. ♂, 1 juv. ♀.

Augusta, VII, 29, 1913, (H.; oak shoots in sand area, one seen), 1 juv. ♂.

Isle of Hope, IX, 3, 1911, (R. & H.), 1 juv. ♀.

Among the eastern representatives of the genus the present species is distinctive in size, form of pronotum in the males, coloration, color pattern and tegminal proportions; in the male the tegmina are very wide for the genus.

Over the area under consideration the present species has been recorded only from Bayville, Virginia; Raleigh, North Carolina, and Thompson's Mills, Georgia. It is, however, widely distributed, though local, our experience having found it to prefer low oaks and oak shoots in woodlands. Adults of the species are not present until late in the season.

***Neoxabea bipunctata* (DeGeer).**

Chestertown, Maryland, VIII, 25, 1899, (E. G. Vanatta), 1 ♀, [A. N. S. P.].  
Rabun County, Georgia., VII, 1910, (W. T. Davis), 2 juv. ♂.  
Billy's Island, Ga., VII, 1912, (J. C. Bradley), 1 ♀.

The remarkable proximal antennal joints, pronotum, callosities of the dorsum of the male abdomen, caudal femora with margins unarmed and supplied distad with two and two very small spurs, cerci and subgenital plate in both sexes, constitute only in part the distinctive characters of this extraordinary and, though scarce, widely distributed species.

On the Atlantic coast it is known from as far north as Portland, Connecticut, the above records being the first for the regions at present under consideration. The species is extremely retiring, living only in the densest tangles of heavy forest undergrowth, where solitary examples can be found only after long-continued and vigorous beating.

*The Genera of the Group Anaxiphites.*

In 1873,<sup>165</sup> Brunner erected the genus *Cyrtoxipha*, but failed to designate by name any species; the following year Saussure used the name and placed in the genus five species,<sup>166</sup> one of which, *gundlachi*, Kirby<sup>167</sup> has selected as genotype. The characters upon which Saussure separated the genera *Cyrtoxipha* and *Anaxipha*<sup>168</sup> have been proven invalid,<sup>169</sup> but we find that two species of the former, *gundlachi* and *columbiana*, possess characters of generic value to separate them from the other species which have been assigned to these genera. We are consequently obliged to restrict the genus *Cyrtoxipha* to these two species and to place all the other American forms, hitherto included in this genus, in the genus *Anaxipha*. This latter genus is as a result found to be very large, the species of which may be divided into several well-marked groups, none of which, however, we feel to be sufficiently differentiated to warrant at present the erection of other genera or subgenera. The type of this genus is *pulicaria* Burmeister as designated by Kirby,<sup>170</sup> who, however, is in error in synonymizing *exigua* and *pulicaria*. The former is a very distinct

<sup>165</sup> *Mittheil. Schweiz. Ent. Gesellsch.*, IV, p. 168, (1873).

<sup>166</sup> *Miss. Sci. Mex.*, Rech. Zool., VI, p. 373, (1874).

<sup>167</sup> *Syn. Cat. Orth.*, II, p. 80, (1906).

<sup>168</sup> Described by that author in the same study. *Miss. Sci. Mex.*, Rech. Zool., VI, p. 370, (1874).

<sup>169</sup> Rehn and Hebard, *Ent. News*, XXIII, p. 411, (1912).

<sup>170</sup> *Syn. Cat. Orth.*, II, p. 86, (1906).

form and cannot be considered in the fixation of the type of the genus *Anaxipha* as it was not one of the originally included species.

The genus *Falcicula*<sup>171</sup> is monotypic and shows close relationship to *Anaxipha*, but it possesses very distinctive characters in the complete absence of auditory foramina on the cephalic tibiae and in the structure of the male tegmina. The ovipositor is similar to that of certain species of *Anaxipha* and has the margins minutely serrulate distad. This feature can scarcely be seen with a hand lens and was missed in the original description.

**CYRTOXIPHA** Saussure.

Genotype: *Cyrtoxipha gundlachi* Saussure.

Head longitudinal, dorsal surface from behind eyes to dorsal apex of inter-antennal protuberance strongly flattened and but little declivent. Eyes longitudinal, much longer than deep, with dorsal margin not raised above plane of flattened portion, more prominent distad than proximad. Last joint of maxillary palpi not as long as penultimate joint, expanding very strongly distad from base with distal truncation transverse, when flattened out nearly forming an equilateral triangle. Cephalic tibiae with auditory foramen open on both faces. (In the two species known, the color is immaculate and delicate, pale green, but this fades almost invariably in drying to a pale brown, which is the same as the general coloration in a number of species of *Anaxipha*. The spines of the dorsal margins of the caudal tibiae are in these species extremely delicate and little longer than the spaces intervening between their bases. A wingless condition apparently does not occur, the wing length, however, is never more than one and one-half times the tegminal length.)

**ANAXIPHA** Saussure.

Genotype: *Anaxipha* [*Gryllus*] *pulicaria* (Burmeister).

Head vertical, dorsal surface not strongly flattened, strongly declivent from occiput to inter-antennal protuberance. Eyes vertical, much deeper than long, evenly protuberant. Last joint of maxillary palpi elongate, longer than penultimate joint, distal truncation transverse or oblique. Cephalic tibiae with auditory foramen open on both faces in winged individuals, in wingless examples normally present, but rarely open, on outer face only, as in winged material. (Distinctive color patterns are developed

<sup>171</sup> Rehn, *Ent. News*, XIV, p. 258, (1903).

in numerous species. The spines of the caudal femora are shorter than, to much longer than, the spaces intervening between their bases. The majority of the species are winged, with wing length more than twice the tegminal length. Numerous species, however, develop a wingless condition, in several this being the normal state.)

#### FALCICULA Rehn.

Genotype: *Falcicula hebarði* Rehn.

Agrees with *Anaxipha*, but the cephalic tibiae possess no auditory foramen and the stridulating area of the male tegmina is minute. (In the one species known the general coloration is uniform pale brown, the size is very small to minute, a winged condition is never developed and the caudal tibiae are more swollen than in any known species of *Anaxipha*.)

#### *Anaxipha exigua* (Say).

##### Maryland.

- Rockville, VIII, 16, (F. Knab), 1 ♀, [U. S. N. M.]  
 Hyattsville, VIII, 2, 1908, (F. Knab), 1 ♂, [U. S. N. M.]  
 Plummer's Island, VIII, 16 to IX, 15, 1907 to 1909, (Caudell, Fisher, Knab), 2 ♂, 1 ♀, [U. S. N. M.]  
 Cabin John Run, VIII, 7, 1902, (T. Pergande), 1 ♀, [U. S. N. M.]

##### District of Columbia.

- Washington, VIII to X, 1878 to 1883, 2 ♂, 10 ♀, [Hebard Cln. and U. S. N. M.]

##### Virginia.

- Glencarlyn, VIII, 12, (A. N. Caudell), 1 ♂, [U. S. N. M.]  
 Falls Church, IX, 4, 1906, (A. N. Caudell), 1 ♂, 2 ♀, [U. S. N. M.]  
 Fredericksburg, VII, 20, 1913, (R. & H.), juv. seen.  
 Petersburg, VII, 22, 1913, (H.), 1 ♂.

##### North Carolina.

- Weldon, VIII, 24, 1913, (R. & H.), 2 juv. ♂.  
 Raleigh, VIII, 16 to X, 14, 1904 to 1906, (Sherman and Brimley), 5 ♂, 8 ♀, [N. C. State Dept. Agr.]  
 Fayetteville, IX, 9, 1911, (R. & H.), 3 ♀.  
 Wilmington, IX, 8, 1911, (H.), 1 ♀.  
 Lake Waccamaw, IX, 8, 1911, (H.), 1 ♂.

##### South Carolina.

- Florence, IX, 6, 1911, (R. & H.), 2 ♂, 7 ♀.

##### Georgia.

- Toccoa, VIII, 28, 1909, (J. C. Bradley), 1 ♂.  
 Lavender, 1 ♂, 1 ♀, [Ga. State Cln.]  
 Thompson's Mills, X, 1909, (H. A. Allard), 1 ♀, [U. S. N. M.]  
 Savannah, VIII, 14, 1903, (A. P. Morse), 1 ♂, 3 ♀.  
 Albany, VII, 31, 1913, (H.), 1 ♀.

##### Florida.

- Jacksonville, (T. J. Priddey), 1 ♂, 1 ♀, [Hebard Cln.]

The larger size, heavy facial markings and narrow but decided dark, longitudinal stripe of the caudal femora readily distinguish this species from any other found in the United States.

Of the present series five females are long winged (Rockville, Washington, Raleigh, Albany and Jacksonville). These and two females with long tegmina and no wings (Virginia near Washington and Thompson's Mills) have the cephalic tibiae with open auditory foramina on both faces, all of the others have this only on the external

face, though a few show a slight depression on the internal face. Considerable size variation is shown, this having no geographic significance.

The species is usually found in luxuriant grasses or weedy tangles, particularly near water, and is often locally very abundant. It was found immature in great numbers in weeds, both along the river and streams in woods (Fredericksburg), very scarce in short grasses in boggy spot in woods (Petersburg), in undergrowth near stream in forest (Weldon), in rank weedy undergrowth on wet ground on edge of pine forest (Fayetteville, Wilmington, Lake Waccamaw), common on or near the ground in low green vegetation growing on edge of "branch" filled with deciduous trees (Florence) and attracted to light in hotel room (Albany).

This species is known on the Atlantic coast as far north as Westbrook, Connecticut; it has been correctly recorded westward to Brownsville, Texas. Numerous records of *pulicaria* from as far northwest as Cuning County, Nebraska, and the Mississippi River, Minnesota, apply to this species.

**Anaxipha pulicaria** (Burmeister). Pl. XIV, fig. 20.

*North Carolina.*

Raleigh, VII, 8, 1903, (A. P. Morse),  
1 ♂, 1 ♀.

Miami, 1887, (E. A. Schwarz), 1 ♀,  
[U. S. N. M.]; (Mrs. A. T. Slosson),  
1 ♂, [M. C. Z.].

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♀.  
Yemassee, IX, 4, 1911, (R. & H.),  
1 ♂, 2 ♀.

*Texas.*

Doucette, VII, 24, 1912, (H.), 1 ♂,  
1 ♀.

Beaumont, VII, 23, 1912, (H.), 10 ♂,  
4 ♀.

*Georgia.*

Tybee Island, IX, 2, 1911, (H.), 8 ♂,  
4 ♀.

Dickinson, VII, 20, 1911, (H.), 2 ♂,  
2 ♀, 2 juv. ♂, 2 juv. ♀.

Thomasville, IV, 9, 1904, (H.), 1 ♂.<sup>172</sup>

Brownsville, VI, 23, 1908, (C. A. Hart;  
at light), 7 ♂, 7 ♀, [Ill. State Lab.  
N. H.]; VII, 31 to VIII, 5, 1912,  
(R. & H.), 2 ♂, 1 ♀; XI, 21 and 23,  
1910, (C. A. Hart), 1 ♂, 2 ♀, [Ill.  
State Lab. N. H.].

*Florida.*

Gainesville, VIII, 16, 1905, (R. & H.),  
1 ♂.<sup>173</sup>

Fort Reed, IV, 23, 1876, 1 ♀, TYPE of  
*Cyrtorhpa delicatula* Scudder,  
[M. C. Z.].

This species is smaller, more compact and robust than *A. exigua*, and is immaculate pale brown in coloration. No cephalic markings are found, except in the Brownsville series, where weakly defined darker markings similar to those of *exigua* appear (figured).

In this series, those from Fort Reed and Miami and the specimens taken at Brownsville in June are long winged; these have open

<sup>172</sup> Misidentified as *A. exigua* by Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1904, p. 801, (1905).

<sup>173</sup> Misidentified as *A. exigua* by Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1907, p. 318, (1907).



auditory foramina on both faces of the cephalic tibiae, while all of the other specimens have this organ only present on the external face of these members.

Wingless females of this species are very similar to the largest females before us of *Falcicula hebardi*, but are readily distinguished by the presence of auditory foramina on the external face of the cephalic tibiae and, though distinctly more compact than *exigua*, are not as compact as *hebardi*. Some variation in the proportions of the caudal tibiae is found, and though the length appears to vary chiefly with the size of the insect, long-winged individuals indicate that in these this measurement proportionately averages slightly greater. Extremes in length of caudal femora in material before us: wingless, ♂ 4.1 to 5, ♀ 4 to 4.9; winged, ♂ 4.7 to 5, ♀ 5 to 5.2 mm.

This insect does not appear to climb up in high grasses and weeds as much as *exigua* does, but prefers low grasses, particularly in wet locations. It was taken in undergrowth near a "branch" (Florence), in wet undergrowth of pine woods (Yemassee, Gainesville), in moderate numbers in low grass on edge of salt marsh (Tybee Island), in "hammock" near stream (Thomasville), common on swampy ground in tangles of low weeds and some raspberry vines, in woods composed mainly of deciduous trees (Beaumont) and not common in undergrowth of pine woods (Dickinson).

The above records define the known limits<sup>174</sup> of the species' distribution in the United States.<sup>175</sup> Numerous records in the literature, of this species from more northern localities, apply without exception to *exigua*, which name was for a long time incorrectly referred to the genus *Nemobius*.

**Anaxipha vittata** (Bolivar). Pl. XIV, fig. 21.

Albany, Georgia, VIII, 1, 1913, (H.; forest undergrowth along edge of Flint River), 1 ♀.  
Atlantic Beach, Florida, VIII, 24, 1911, (H.; in tangles of raspberry vines in jungle of cabbage palmetto and live oak), 1 ♂.

Punta Gorda, Fla., (Mrs. A. T. Slosson), 1 ♀, [M. C. Z.].  
Key West, Fla., III, 15, 1910, (H.; in short, heavy grasses growing in open, on scant soil beside a wet depression in the Key West oolitic limestone), 1 ♀.<sup>176</sup>

<sup>174</sup> The authors' previous record of a single specimen from Key West, Florida, was based on the specimen here correctly recorded under *A. vittata*.

<sup>175</sup> We have thought best to record here all of the material of the species before us from the United States, in order to correct and define as fully as possible the distribution of the species in this country.

<sup>176</sup> Misidentified as *A. pulicaria* by Rehn and Hebard, PROC. ACAD. NAT. SCI. PHILA., 1912, p. 274, (1912).

This insect agrees with *A. pulicaria* in many respects, but is a smaller, more delicate species. A distinctive color pattern is developed which, when present, readily distinguishes the species.<sup>177</sup> This is strongly marked in the specimens from Atlantic Beach (figured) and Punta Gorda, but very weakly indicated and only by the marking of the occiput and dorsum of the pronotum in the other two specimens.

The specimens here recorded are wingless, numerous long-winged examples are present, however, in the exotic series before us. All of the winged individuals have open auditory foramina on both faces of the cephalic tibiae; in the wingless examples this organ is missing on the inner face of these members.

This tiny species was not previously known to exist within the United States, a large series now before us shows it to be probably the most abundant and widely distributed species of the genus in Cuba and on the Gulf coast of Mexico.

**Falcicula hebardi** Rehn.

*New Jersey.*

Reega, Atlantic County, VII, 31 and VIII, 10, 1914, (H.), 4 ♀.

*Maryland.*

Near Plummer's Island, VI, 17, 1913, (W. L. McAtee), 1 ♀, [U. S. N. M.].

*Virginia.*

Near Washington, D. C., V, 30, 1883, 1 ♀, [Hebard Cln.].

Petersburg, VII, 22, 1913, (R. & H.), 4 ♀, 3 ♀.

Cape Henry, VII, 2, 1903, (A. P. Morse), 1 ♀.

*North Carolina.*

Goldsboro, VII, 25, 1913, (R. & H.), 1 ♂, 4 ♀.

Raleigh, VII, 8, 1903, (A. P. Morse), 2 ♂, 8 ♀.

Greensboro, VII, 26, 1913, (H.), 1 ♂.

*South Carolina.*

Florence, IX, 6, 1911, (R.), 1 ♀.

Yemassee, IX, 4, 1911, (R. & H.), 1 ♂, 2 ♀.

*Georgia.*

Isle of Hope, IX, 3, 1911, (R. & H.), 1 ♀.

Hebardville, V, 15, 1915, (H.), 1 ♀, 2 juv. ♀.

Suwannee Creek, VIII, 28, 1911, (H.), 1 ♂.

Cumberland Island, VIII, 31, 1911, (R. & H.), 1 ♂, 1 ♀.

*Texas.*

Doucette, VII, 24, 1912, (H.), 2 ♂, 2 ♀.

Beaumont, VII, 23, 1912, (H.), 2 ♂.

Dickinson, VII, 20, 1912, (H.), 22 ♂, 21 ♀.

Individuals of this minute species are distinguishable from any others of the Group Anaxiphites, not only by the absence of auditory foramina on the cephalic tibiae, but also the remarkable reduction

<sup>177</sup> Large exotic series before us show that the species develops an unusual complexity of markings. Certain examples, in the Mexican series, are exceptional in having the caudal femora suffused dorsad and narrowly banded mesad on the outer face with very dark brown, while rare individuals have the dorsal field of the tegmina fuscous. Other specimens have no dark markings whatever and can only with difficulty be separated from small individuals of *A. pulicaria*, which species is, however, appreciably more robust.

of the tegminal stridulating apparatus in the male sex. The general coloration is immaculate pale yellowish brown, with no trace of cephalic markings. The species does not appear ever to develop wings and the tegmina have a more regularly convex contour than in the species of the allied genera.

The species is usually found in greatest numbers in the dry wire-grass and dead needles of the pine woods. It has twice been found in considerable numbers in such situations (Thomasville, Georgia; Dickinson, Texas). The above series was found very rare in heavy grasses of pine forest, *Pinus rigida* (Reega), occasional in grasses in boggy opening in woods (Petersburg), few in number in dry grasses under short-leaf pines, *Pinus echinata* (Goldsboro), in short grass on edge of forest (Greensboro), undergrowth of pine woods (Yemassee), undergrowth of gray-bark pine forest, *Pinus* sp. (Isle of Hope), in dry wire-grass and dead pine needles of long-leaf pine woods, *Pinus palustris* (Cumberland Island) and in heavy undergrowth of same (Hebardville, Suwannee Creek).

The present species has been previously correctly recorded only from the type locality, Thomasville, Georgia, and from Gainesville, Florida.<sup>178</sup>

**Cyrtoxipha gundlachi** Saussure.

Silver Springs, Florida, XI, 25, 1911, (G. P. Englehardt), 1 ♀, [Hebard Cln.].

This species is only known in the United States from peninsular Florida and has not been previously correctly recorded north of Punta Gorda;<sup>179</sup> it is widely distributed in the West Indies and is known from Central and northern South America.

The present specimen is no larger than the average individuals from Key West, Florida.

**Cyrtoxipha columbiana** Caudell.

*North Carolina.*

Stem, end of X, 1908, 1 ♀, [N. C. State Dept. Agr.].

Raleigh, VIII, 24, 1905, X, 3, 1908, (C. S. Brimley), 1 ♂, 1 ♀, [Brimley Cln.].

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂.

*Georgia.*

Hoschton, VII, 26, 1909, (H. A. Allard), 3 ♂, [U. S. N. M. and Hebard Cln.].

<sup>178</sup> As the distribution of the species has been found to be so much more extensive than was previously known, we have here recorded all of the material before us in order to define as fully as possible its range. The records of this species (♀), and *Anaxipha exigua* (♂), from Cabañas, Cuba, are incorrect, the material being properly referable to *Anaxipha vittata*. Rehn, *2d Rept. Cent. Exp. Sta. Repub. Cuba*, pp. 223, 224, (1909).

<sup>179</sup> Ashmead's record from Utica, Mississippi, applies properly to *C. columbiana*. *Ins. Life*, VI, p. 25, (1894).

Brunswick, VIII, 30, 1911, (H.), 1 ♀.  
De Witt, VII, 24, 1912, (J. C. Bradley), 3 ♂.

Spring Creek, VII, 16 to VIII, 28, 1912 and 1913, (J. C. Bradley), 2 ♂, 2 ♀.

*Florida.*

Atlantic Beach, VIII, 25, 1911, (R. & H.), 4 ♀.

*Mississippi.*

Hattiesburg, VII, 17, 1905, (A. P. Morse), 1 ♀.

*Texas.*

Dallas, (J. Boll), 2 ♀, [M. C. Z. and U. S. N. M.].

Doucette, VII, 24, 1912, (H.), 2 ♂, 2 ♀.

This species is very closely related to *C. gundlachi*. It may be distinguished by its greater size, more specialized and elongate titillatores of the male, which normally extend well beyond the distal margin of the subgenital plate, heavier and longer ovipositor with heavier serrulations (in this character, however, only showing a proportionate size increase in the larger species) and tegmina which usually show a few weak and irregularly placed transverse veinlets. The beautiful and brilliant, though pale, green coloration of both these species in life, almost entirely disappears in dried material.

In the series before us the following extremes in length are found: tegmen, ♂ 5.6 to 6.8, ♀ 6.3 to 7; wing, ♂ 7.3 to 9.2, ♀ 8.8 to 9.4; caudal femur, ♂ 5 to 5.7, ♀ 5.3 to 5.8; ovipositor 3.2 to 3.6 mm.

The species is thamnophilous and dendrophilous and has never been found in the least abundant. Its small size and retiring habits make it a very difficult insect to collect. The present material was taken in a deep forest of gum, sweet gum, etc. (Florence), beaten from bayberry bushes, *Myrica cerifera*, near stream in forest (Brunswick) and from the same on edge of pine woods (Atlantic Beach), and was found scarce in low bushes, particularly in shoots of sweet gum, along stream in forest (Doucette).

The insect was described from Washington, District of Columbia, and Falls Church, Virginia, the northernmost localities from which it is known, and has been previously recorded from Raleigh, North Carolina, and Bainbridge, Georgia. The present records considerably extend the known range of the species westward.<sup>180</sup>

***Phylloscyrtus pulchellus* (Uhler).**

*Maryland.*

Chestertown, VIII, 17 to 26, 1899, (E. G. Vanatta), 1 ♂, 4 ♀, [A. N. S. P.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (H.), 1 juv. ♂.

Petersburg, VII, 22, 1913, (R. & H.), 2 juv. ♂, 1 juv. ♀.

*North Carolina.*

Alamance County, VII, 1905, (F. Sherman, Jr.), 1 juv. ♂, [N. C. State Dept. Agr.].

Weldon, VII, 24, 1913, (R. & H.), 1 juv. ♂.

Goldsboro, VII, 25, 1913, (R. & H.), 3 juv. ♀.

Fayetteville, IX, 9, 1911, (R. & H.), 1 ♂, 1 ♀.

<sup>180</sup> We have thought best to record here all of the material of this little-known species before us. See additional record for species, footnote 179.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.),  
10 ♂, 10 ♀.

Columbia, VII, 28, 1913, (H.), 1 ♂.

Ashley Junction, VIII, 15, 1913, (R.),  
1 ♀.

*Georgia.*

Clayton, VI, 1909, (W. T. Davis),  
1 juv. ♀, [Davis Cln.].

Lavender, VIII, 23, 1910, (J. C.  
Bradley), 1 ♀.

Buckhead, VIII, 2, 1913, (R. & H.),  
1 juv. ♂, 1 juv. ♀.

Macon, VII, 30 and 31, 1913, (R. &  
H.), 1 ♂.

Columbus, VIII, 9, 1913, (J. C. Brad-  
ley), 2 ♂, 2 ♀.

Savannah, VII, 31, 1913, (J. C. Brad-  
ley), 1 ♀; VIII, 14, 1903, (A. P.  
Morse), 8 ♂, 14 ♀.

Sandfly, IX, 3, 1911, (H.), 1 ♂, 1 ♀.

Isle of Hope, IX, 3, 1911, (R. & H.),  
1 ♂, 1 ♀.

Billy's Island, VI, 12, 1912, (J. C.  
Bradley), 1 juv. ♂; IX, 1 to 5,  
1913, (J. C. Bradley), 1 ♂.

Albany, VIII, 1, 1913, (R. & H.),  
19 ♂, 26 ♀, 3 juv. ♀.

Thomasville, VI, 29, 1903, (for  
Hebard), 1 juv. ♂, [Hebard Cln.].

*Florida.*

Jacksonville, (T. J. Priddey), 1 ♂,  
1 ♀, [Hebard Cln.].

Sanford, (G. B. Frazer), 1 ♂,  
[M. C. Z.].

The large series before us shows little size variation. The majority of specimens from the more southern points average darker in coloration, with colors more intense and brilliant. In this species the wings are always present and nearly as long as, but wholly concealed by, the tegmina.

The material here studied was taken: in weeds near Rappahannock River (Fredericksburg), in green undergrowth of heavy forest near stream (Weldon), common in low green undergrowth of "branch" and beaten from heavy green undergrowth in short-leaf pine forest (Columbia), beaten from undergrowth of long-leaf pine woods (Ashley Junction), scarce in tall weeds near stream in oak and short-leaf pine woods (Buckhead), in small clump of sweet gum shoots in gray-bark pine forest (Sandfly), in heavy undergrowth of gray-bark pine forest (Isle of Hope) and common in tangles of small bushes and vines along Flint River (Albany). The species has been recorded as far north on the Atlantic coast as Staten Island, New York; westward its distribution extends far beyond the regions here under consideration.

***Hapithus agitator agitator* Uhler.***District of Columbia.*

Washington, X, 1883, 1 ♂, 2 ♀,  
[Hebard Cln.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. &  
H.; common in undergrowth of  
deciduous forest), 2 juv. ♀.

Orange, VII, 21, 1913, (R. & H.; very  
scarce in undergrowth of deciduous  
forest), 1 juv. ♂.

Petersburg, VII, 23, 1913, (H.; in  
vegetation of boggy spot near  
woods), 1 juv. ♀.

Norfolk, IX, 8, 1903, (A. P. Morse),  
1 ♂, 3 ♀.

We have a large series of adults before us from more northern points on the Atlantic coast, where the species has been recorded as far north as Tottenville, Staten Island, New York.



This geographic race is found to merge with the more southern race, *agitator quadratus*, along the fall line in North Carolina, this being shown by intermediate material before us from Raleigh. These races show little definite differentiation, but typical *agitator* may be said to differ from *agitator quadratus* in the average smaller size; tegmina which normally do not quite reach the distal extremity of the abdomen, in the male with speculum normally lacking a transverse vein and with length of same more nearly approximating its width, in the female with veins normally more irregular and not affording a pattern as generally longitudinal; the caudal femora in length also average proportionately slightly less.

A large series before us from other points in the southeastern United States, particularly those on the Piedmont plateau, are immature, and we are consequently unable to assign the individuals properly. We believe, however, that *agitator agitator* occurs on the Piedmont plateau at least as far south as Atlanta, Georgia. This race is known to occur as far westward as the timbered portions of eastern Nebraska.

**Hapithus agitator quadratus** Scudder.

*North Carolina.*

Wrightsville, IX, 7, 1911, (R. & H.),  
10 ♂, 15 ♀, 1 juv. ♂.  
Wilmington, IX, 8, 1911, (H.), 1 ♂,  
1 ♀.  
Lake Waccamaw, IX, 8, 1911, (R. &  
H.), 4 ♂, 4 ♀, 1 juv. ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R. & H.), 1 ♂,  
2 ♀, 1 juv. ♀.  
Ashley Junction, VIII, 15, 1913, (R.),  
2 ♂, 3 juv. ♂, 5 juv. ♀.

*Georgia.*

Savannah, VIII, 14, 1903, (A. P.  
Morse), 6 ♂, 8 ♀, 2 juv. ♀.  
Isle of Hope, IX, 3, 1911, (R. & H.),  
9 ♂, 10 ♀, 1 juv. ♂, 2 juv. ♀.  
St. Simon's Island, VIII, 30, 1911,  
(R. & H.), 2 ♂, 5 ♀.  
Albany, VIII, 1, 1913, (R. & H.),  
1 juv. ♂.

*Florida.*

Jacksonville, (T. J. Priddey), 4 ♂,  
1 ♀, [Hebard Cln.].  
Atlantic Beach, VIII, 24 and 25, 1911,  
(R. & H.), 4 ♂, 5 ♀.  
Grant, VII, 1898, 1 ♂, 1 ♀, [Davis  
Cln.].  
Miami, (Mrs. A. T. Slosson), 1 ♂,  
1 ♀, [M. C. Z.].

*Texas.*

Doucette, VII, 24, 1912, (H.), 1 ♀.  
Dallas, (J. Boll), 1 ♂, 1 ♀, [M. C. Z.].  
Kerrville, VIII, 17, 1912, (H.), 1 ♀.  
Flatonia, VIII, 20, 1912, (H.), 2 ♂.  
San Antonio, VIII, 16, 1912, (R. &  
H.), 2 ♂.  
Victoria, VII, 27, 1912, (H.), 8 ♂,  
1 ♀, 1 juv. ♀.  
Brownsville, VII, 31, 1912, (H.), 4 ♂,  
3 ♀.  
Piper Plantation, near Brownsville,  
VIII, 3, 1912, (R. & H.), 1 ♂, 6 ♀.

We have recorded above all of the previously unrecorded material of this geographic race from within the United States before us, in order to define more fully its known distribution.

There is considerable variation in the coloration of the form. Occasional specimens have the caudal femora strongly infuscated



medio-longitudinally, the exposed portion of the limb below this being very pale, often cream color; a similar condition is often weakly indicated, while in many series the caudal femora are concolorous with the general coloration. The intermediate channel in the tegmina is also occasionally strongly defined in yellowish white, often this is weakly indicated, while many individuals have this portion concolorous with the rest of the tegmen.

The present material was found common in low vegetation under live oaks on barrier beach (Wrightsville), on low wet ground in undergrowth of pine woods (Wilmington, Yemassee), in green undergrowth of deep forest (Florence), young numerous, but few adults in undergrowth of dry woods (Ashley Junction), common in heavy undergrowth of gray-bark pine forest (Isle of Hope), scarce in tangle of vines and bushes along Flint River (Albany), in heavy undergrowth of jungle "hammock" and in bayberry bushes (Atlantic Beach), in stream bottom choked with deciduous trees (Kerrville, Flatonia), young common, few adults, in scant undergrowth of mixed pine and deciduous forest (Doucette), in rank, high green grasses and nettles along wooded stream (San Antonio), in stream bottom in tangles of vines growing in high weeds (Victoria), by beating tall green weeds in river bottom tangles (Brownsville) and in low heavy jungle tangles (Piper Plantation).

We have found this race abundant in extreme southern Florida and on the Florida Keys.

**Hapithus brevipennis** Saussure.

*Georgia.*

Savannah, VII, 31, 1913, (J. C. Bradley), 1 juv. ♀.

Isle of Hope, IX, 3, 1911, (R. & H.), 2 ♂, 1 ♀.

Sandfly, IX, 3, 1911, (R. & H.), 2 ♂, 3 ♀.

Jesup, IX, 1, 1911, (H.), 1 ♀.

St. Simon's Island, VIII, 30, 1911, (R. & H.), 1 ♂, 2 ♀.

Billy's Island, IX, 1 to 15 and XII, 23, 1913, (J. C. Bradley), 2 ♂, 2 ♀, 1 juv. ♀.

*Florida.*

Jacksonville, VIII, 1885, (W. H. Ashmead), 1 ♂, 1 ♀; (T. J. Priddey), 1 ♂, [all Hebard Chn.].

Atlantic Beach, VIII, 24, 1911, (R. & H.), 1 ♂, 1 ♀.

Live Oak, VIII, 26, 1911, (H.), 1 ♂.

Some size variation, irrespective of geographic distribution, is shown by the material before us.

The material taken by us was beaten from luxuriant undergrowth of gray-bark pine forest (Isle of Hope, Sandfly), found scarce under live oaks in area of *Helianthemum coraliniatum* (St. Simon's Island), beaten from tangles of grape, raspberry and other vines in jungle "hammock" (Atlantic Beach) and one found on sandy soil among wire-grass (Live Oak).

The type localities, Georgia and Louisiana, our previous records from Thomasville, Georgia, and Pablo Beach, San Pablo and Gainesville, Florida, with those given above, define the known distribution of this beautiful and interesting species.

*Orocharis saltator* Uhler.

*Orocharis gryllodes* Saussure (not *Gryllus gryllodes* Pallas, 1772). (In part.)

*Maryland.*

Point of Rocks, VIII, 19, 1883, 1 ♂,  
[Hebard Chn.].

Washington, D. C., X, 1883, 2 ♂, 2 ♀,  
[Hebard Chn.].

*Virginia.*

Fredericksburg, VII, 20, 1913, (R. & H.), 1 juv. ♂.

Petersburg, VII, 23, 1913, (R. & H.), 1 juv. ♀.

*North Carolina.*

Weldon, VII, 24, 1913, (R. & H.), 2 juv. ♀.

Goldsboro, VII, 25, 1913, (R. & H.), 1 juv. ♂.

Charlotte, VII, 27, 1913, (R. & H.), 1 juv. ♀.

*South Carolina.*

Florence, IX, 6, 1911, (R.), 1 ♀.

Columbia, VII, 28, 1913, (R. & H.), 1 juv. ♀.

Isle of Palms, VIII, 15, 1913, (R.), 1 juv. ♀.

Ashley Junction, VIII, 15, 1913, (R.), 3 juv. ♂, 3 juv. ♀.

*Georgia.*

Rabun County, VII, 1910, (W. T. Davis), 4 juv. ♂, 4 juv. ♀.

Isle of Hope, IX, 3, 1911, (R. & H.), 1 juv. ♀.

Macon, VII, 31, 1913, (R. & H.), 1 juv. ♂, 1 juv. ♀.

St. Simon's Island, VIII, 30, 1911, (R.), 1 ♀.

Billy's Island, VI and VII, 1912, (J. C. Bradley), 3 juv. ♂.

*Florida.*

Jacksonville, (Priddey; Ashmead), 2 ♀, [Hebard Chn.]; XI, 3, 1911, (W. T. Davis), 1 juv. ♀.

Pablo Beach, XI, 4, 1911, (W. T. Davis), 2 ♂.

Silver Springs, XI, 25, 1911, (G. P. Englehardt), 2 ♂, 1 ♀, [B. I. and Hebard Chn.].

West Indian material before us and study of the literature has shown that *Orocharis sauleyi* (Guérin) is a synonym of *Orocharis gryllodes* (Pallas),<sup>181</sup> that West Indian form is known in the United States only from extreme southern Florida.

The present species was in part correctly recorded by Saussure, but material from the southern States was referred by him to *gryllodes*. We have now sufficient material before us to determine that *saltator* and, in part, *gryllodes* of Saussure<sup>182</sup> (but not of Pallas) are conspecific.

It is true that material of the present species from the southern United States often shows a somewhat heavier development with pronotum proportionately more ample, and in such specimens the mediastine vein of the tegmina frequently bears a greater number of branches. These features are, however, by no means constant;

<sup>181</sup> See Hebard, *Ent. News*, XXVI, p. 468, (1915).

<sup>182</sup> See Saussure, *Mélang. Orth.*, II, p. 755, (1878). That author has evidently also placed West Indian specimens of the group to which *vaginalis* belongs (which group probably merits generic distinction) under this name. The present species never develops a green phase as described by that author.

in specimens from the same locality a remarkable difference in pronotal amplitude in the same sex is often present,<sup>183</sup> while the branching of the mediastine vein is extremely irregular and cannot be relied upon as in any way diagnostic.<sup>184</sup>

The normal coloration of this insect is pale and immaculate reddish brown. Some specimens have the occiput, post-ocular portions of the genæ and dorsal portions of the lateral lobes of the pronotum infuscated; in others these markings are very dark and the dorsum of the pronotum and the tegmina and limbs are mottled and speckled with the same shade. Frequently in such maculate individuals the general coloration is grayish.

The species is known on the Atlantic coast as far north as Matawan, New Jersey; it is found far westward of the regions here considered.

Of the present series we found the young common in undergrowth of deciduous forest (Fredericksburg), young in undergrowth of pine woods (Petersburg), few immature examples in green undergrowth of heavy forest near stream (Weldon), few young in green grasses and weeds in short-leaf pine woods (Goldsboro), on green sprouts in "branch" filled chiefly with gums (Florence), young beaten from bayberry (Isle of Palms), young numerous in undergrowth of dry pine woods (Ashley Junction), young in luxuriant undergrowth of gray-bark pine woods (Isle of Hope) and in bushes apparently killed by a remarkable hymenopterous parasite, *Rhopalosoma poeyi* Cresson (St. Simon's Island).

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<sup>183</sup> In material before us we find the following contrasts in these dimensions: Silver Springs, ♂, 2.3 by 3.4 and 2.7 by 3.9; Thomasville, Georgia, ♀, 2.4 by 3.6 and 2.9 by 3.8 mm.

<sup>184</sup> All or part of the free veins of the lateral field of the tegmina sometimes merge with the mediastine vein at its base, and can then scarcely be distinguished from the normal branches of that vein. The branches of the mediastine vein also bifurcate, though rarely, while distad the vein itself frequently assumes abnormal positions which, in themselves, bring about further differences in the number of branches. The branches of this vein Saussure gives: for *saltator*, ♂ 7 to 8, ♀ 4 to 6; for *grylloides*, ♂ 10 to 11, ♀ 7 to 10. In our series are males showing 8-9, 9-9 and 8-10 and females showing 5-7 and 6-7 of these branches, such material not being from areas where intergradation would be likely to occur, were geographic races present.

## EXPLANATION OF PLATES XII, XIII, XIV.

- PLATE XII.—Fig. 1.—*Neoltitix proavus* new species. Macon, Georgia. Female (TYPE). Lateral outline. ( $\times 5$ )
- Fig. 2.—Same. Female (TYPE). Cephalic outline of head. ( $\times 5$ )
- Fig. 3.—*Tettigidea armata* Morse. Florence, South Carolina. Male. Outline of cephalic margin of dorsum of pronotum (no cusp). (Greatly enlarged.)
- Fig. 4.—*Tettigidea armata* Morse. Florence, South Carolina. Male. Outline of cephalic margin of dorsum of pronotum (moderately cuspidate). (Greatly enlarged.)
- Fig. 5.—*Tettigidea armata* Morse. Florence, South Carolina. Male. Outline of cephalic margin of dorsum of pronotum (strongly cuspidate). (Greatly enlarged.)
- Fig. 6.—*Orphulella halophila* new species. Key West, Florida. Female (TYPE). Lateral figure. ( $\times 2$ )
- Fig. 7.—Same. Female (TYPE). Dorsal outline of head and pronotum. ( $\times 2$ )
- Fig. 8.—Same. Male (allotype). Dorsal outline of head and pronotum. ( $\times 2$ )
- Fig. 9.—*Spharagemon crepitans* (Saussure). St. Simon's Island, Georgia. Male. Dorsal figure. ( $\times 2$ )
- Fig. 10.—Same. St. Simon's Island, Georgia. Male. Lateral figure. ( $\times 2$ )
- Fig. 11.—*Melanoplus nubilus* new species. Fayetteville, North Carolina. Male (TYPE). Lateral outline. ( $\times 2$ )
- Fig. 12.—*Melanoplus stegocereus* new species. Cannoche River at Groveland, Georgia. Male (TYPE). Lateral outline. ( $\times 2$ )
- Fig. 13.—*Melanoplus mirus* new species. Weldon, North Carolina. Male (TYPE). Lateral outline. ( $\times 2$ )
- Fig. 14.—*Melanoplus scapularis* new species. Jesup, Georgia. Male (TYPE). Lateral outline. ( $\times 2$ )

PLATE XIII.—The enlargement of the supra-anal plates is about 10 times, of the cerci about 25 times and of the subgenital plates about 10 times.

- Fig. 1.—*Melanoplus decorus* Scudder. Winter Park, North Carolina. Male. Dorsal figure of supra-anal plate and furcula.
- Fig. 2.—Same. Winter Park, North Carolina. Male. Lateral outline of cercus.
- Fig. 3.—*Melanoplus australis* Morse. Isle of Hope, Georgia. Male. Dorsal figure of supra-anal plate and furcula.
- Fig. 4.—Same. Isle of Hope, Georgia. Male. Lateral outline of cercus.
- Fig. 5.—*Melanoplus attenuatus* Scudder. Magnolia, South Carolina. Male. Dorsal figure of supra-anal plate and furcula.
- Fig. 6.—Same. Magnolia, South Carolina. Male. Lateral outline of cercus.
- Fig. 7.—*Melanoplus hebardii* (Rehn). Tyty Plantation, Thomas County, Georgia. Male (TYPE). Dorsal figure of supra-anal plate and furcula.
- Fig. 8.—Same. Male (TYPE). Lateral outline of cercus.
- Fig. 9.—*Melanoplus nubilus* new species. Fayetteville, North Carolina. Male (TYPE). Dorsal figure of supra-anal plate and furcula.
- Fig. 10.—Same. Male (TYPE). Lateral outline of cercus.
- Fig. 11.—*Melanoplus stegocereus* new species. Cannoche River at Groveland, Georgia. Male (TYPE). Dorsal figure of supra-anal plate.
- Fig. 12.—Same. Male (TYPE). Lateral outline of cercus.
- Fig. 13.—Same. Male (TYPE). Lateral outline of subgenital plate.
- Fig. 14.—*Melanoplus mirus* new species. Weldon, North Carolina. Male (TYPE). Dorsal figure of supra-anal plate.
- Fig. 15.—Same. Male (TYPE). Lateral outline of cercus.
- Fig. 16.—Same. Male (TYPE). Lateral outline of subgenital plate.
- Fig. 17.—*Melanoplus scapularis* new species. Jesup, Georgia. Male (TYPE). Dorsal figure of supra-anal plate.

Fig. 18.—Same. Male (TYPE). Lateral outline of cercus.

Fig. 19.—*Melanoplus strumosus* Morse. Currahee Mountain, Georgia. Male. Dorsal figure of supra-anal plate and furcula.

Fig. 20.—Same. Currahee Mountain, Georgia. Male. Lateral outline of cercus.

Fig. 21.—Same. Currahee Mountain, Georgia. Male. Lateral outline of subgenital plate.

PLATE XIV.—Fig. 1.—*Melanoplus quercus* new species. Thomasville, Georgia. Male (TYPE). Lateral outline of cercus ( $\times 5$ )

Fig. 2.—Same. Male (TYPE). Lateral outline of cercus and subgenital plate. ( $\times 3\frac{1}{2}$ )

Fig. 3.—Same. Male (TYPE). Dorsal figure of supra-anal plate. ( $\times 5$ )

Fig. 4.—*Scapteriscus vicinus* Scudder. St. Simon's Island, Georgia. Female. Lateral outline (internal) of dactyls of cephalic tibia. ( $\times 4\frac{1}{2}$ )

Fig. 5.—Same. St. Simon's Island, Georgia. Female. Dorsal figure of pronotum. ( $\times 2$ )

Fig. 6.—Same. St. Simon's Island, Georgia. Female. Lateral outline (external) of distal joint of caudal tarsus and claws. ( $\times 4$ )

Fig. 7.—Same. St. Simon's Island, Georgia. Female. Lateral outline (internal) of spatula. ( $\times 4\frac{1}{2}$ )

Fig. 8.—*Scapteriscus adetus* new species. Hebardville, Georgia. Male (TYPE). Lateral outline (internal) of dactyls of cephalic tibia. ( $\times 4\frac{1}{2}$ )

Fig. 9.—Same. Male (TYPE). Dorsal figure. ( $\times 2$ )

Fig. 10.—Same. Male (TYPE). Lateral outline (external) of distal joint of caudal tarsus and claws. ( $\times 4$ )

Fig. 11.—Same. Male (TYPE). Lateral outline (internal) of spatula. ( $\times 4\frac{1}{2}$ )

Fig. 12.—*Scapteriscus mexicanus* (Burmeister). Durango, Mexico. Female. Lateral outline (internal) of dactyls of cephalic tibia. ( $\times 4\frac{1}{2}$ )

Fig. 13.—Same. Durango, Mexico. Female. Dorsal figure of pronotum. ( $\times 2$ )

Fig. 14.—Same. Durango, Mexico. Female. Lateral outline (external) of distal joint of caudal tarsus and claws. ( $\times 4$ )

Fig. 15.—Same. Durango, Mexico. Female. Lateral outline (internal) of spatula. ( $\times 4\frac{1}{2}$ )

Fig. 16.—*Scapteriscus abbreviatus* Scudder. Musa Isle near Miami, Florida. Female. Lateral outline (internal) of dactyls of cephalic tibia. ( $\times 4\frac{1}{2}$ )

Fig. 17.—Same. Musa Isle near Miami, Florida. Female. Dorsal figure of pronotum. ( $\times 2$ )

Fig. 18.—Same. Musa Isle near Miami, Florida. Female. Lateral outline (external) of distal joint of caudal tarsus and claws. ( $\times 4$ )

Fig. 19.—Same. Musa Isle near Miami, Florida. Female. Lateral outline (internal) of spatula. ( $\times 4\frac{1}{2}$ )

Fig. 20.—*Anaxipha pulicaria* (Burmeister). Beaumont, Texas. Male. Cephalic figure of head. (Nearly  $\times 5$ )

Fig. 21.—*Anaxipha vittata* (Bolivar). Atlantic Beach, Florida. Male. Cephalic figure of head. (Nearly  $\times 5$ )